



CITY OF BERKLEY ENGINEERING DESIGN STANDARDS

The Engineering Design standards herein are intended to provide a basis upon which all site plans for commercial, and single and multi-family sites within the City of Berkley are to be designed and constructed. The requirements outlined herein reflect the requirements of the City of Berkley Department of Public Works and the City's Engineering Consultant and conform to current Engineering practices in the Metropolitan Detroit area. By no means are these standards intended as a substitute for Sound Professional Engineering judgment. The Standards may not apply to all conditions, and alternative solutions may be *permitted* as approved by the pertinent City departments and/or its Engineering Consultant. It is suggested that the applicant obtains a copy of the City of Berkley Zoning Ordinance and Chapter 26, Chapter 106 and Chapter 126 of the Berkley Code of Ordinances to supplement these standards.

Engineering review for site plan review shall be conducted by the City's Engineering Consultant as directed by the City as per the following Engineering Design standards.

Additional reference standards, as well as permitting, that may be applicable to the required Engineering Design standards include:

1. Oakland County Water Resources Commissioner (Stormwater Engineering Design Standards, Water Supply and Wastewater Design Standards) (OCWRC)
2. Oakland County Erosion Control Manual
3. Road Commission for Oakland County Design Standards (RCOC)
4. Southeastern Oakland County Water Authority (SOCWA)
5. The United States Environmental Protection Agency (EPA)
6. Michigan Department of Environment, Great Lakes, and Energy (EGLE)
7. Recommended Standards for Wastewater Facilities (Ten States Standards)
8. Recommended Standards for Water Works (Ten States Standards)
9. Michigan Department of Transportation Standard Specifications for Construction
10. Michigan Department of Transportation – Uniform Criteria for Major Streets
11. Michigan Manual of Uniform Traffic Control Devices

In addition, there may be the need to obtain approval and/or construction/access permits from communities bordering the City of Berkley, including Cities of Southfield, Royal Oak, Huntington Woods and Oak Park.

The site plan must be reviewed and approved by the planning commission and the appropriate City department(s) and/or professional consultants based on the standards herein and as per Article 15 of the City of Berkley Zoning Ordinance. Following preliminary site plan approval, the applicant must submit drawings for final site plan approval as described in this document. Site work permit review and approval will be contingent upon approval of the final site plan, receipt and review of the traffic control plan(s), the stormwater maintenance agreement, and receipt of all approved permits and/or permit exemptions.

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SECTION 1: GENERAL

- 1.1. Complete improvement plans bearing the seal of a licensed Professional Engineer, Surveyor or Architect licensed to practice in the State of Michigan shall be submitted prior to review and approval of any portion thereof.
- 1.2. A certified boundary survey of the site, prepared and sealed by a licensed Professional Surveyor licensed to practice in the State of Michigan, or a copy of the completed plat shall be submitted with the engineering drawings.
- 1.3. Plans submitted shall be formatted for 11" x 17" white prints having blue or black lines and shall be neatly and accurately prepared. Judgment should be exercised in the design, layout, and the presentation of proposed improvements. An electronic version of the plans must be made available for submittals. The topographic survey must depict one-half foot contours of the area, shall be on a scale of a least one-inch equals ten feet (1"=10'), and shall show all property and structures within 25 feet of the property for which the permit is being sought.
- 1.4. For projects or subdivisions having more than one sheet of plans, a general plan having a scale of 1" = 100' shall be provided showing the overall project and indicating the size and general location of all improvements shown in the detailed plans.
- 1.5. Street names, street and easement widths, lot lines, lot dimensions, lot numbers and ownership shall be shown on all plans.
- 1.6. Elevations shall be on U.S.G.S. Datum. Two (2) permanent benchmarks for the work shall be indicated on the plans.
- 1.7. Existing grades and elevations must be provided at each lot corner and grade change points.
- 1.8. The finished grade shall be indicated for all structures.
- 1.9. Finish grade and finish floor elevations for the first floor, garage and basement. Provide the finish grade elevation of adjacent houses or structures. The grading plan must also indicate if the adjacent lot is unimproved.
- 1.10. The location and elevations of all utilities, including manholes on or within 25 feet of the property, must be shown on the plans.
- 1.11. Plans shall show the location of existing and proposed sidewalks and driveways, including the slope of the driveway to the street. All sidewalks and driveways shall be compliant with state, and local laws, ordinances, and requirements.

- 1.12. Provide temporary and permanent soil erosion and sedimentation control, including, but not limited to, silt fencing, catch basin inserts in the street adjacent to the subject property, etc.
 - 1.13. Roof downspouts are not permitted to discharge directly into the combined storm sewer system and must be directed onto grass, landscape, or other green space area to prevent ponding of water on the property or from being directed towards adjacent properties.
 - 1.14. Existing sewer lead shall be properly abandoned, and the proposed sewer lead must include a new connection, as approved by the Department of Public Works. Existing sewer lead may be retained, at the City's Engineer's discretion, if the CCTV inspection shows that the pipe is in reasonable condition and the pipe material is PVC. However, the existing pipe will require a cured-in-place pipe lining as well as a new tap connection (T-Liner).
 - 1.15. Plans must show the location of existing trees within the right-of-way.
 - 1.16. Confirmation that a Design MISS DIG ticket has been requested and processed must be provided by noting the ticket number of the plan.
 - 1.17. A demolition plan must be included with all site plans depicting all pavement, utilities, landscape, and other site features that are to be removed as part of the project.
 - 1.18. The developer or their engineer shall be responsible to forward plans for approval to any private utility company (gas, electric, phone, cable, etc.) and any Federal, State or County (Water Resource Commissioner, Road Commission, etc.) agency whose facilities or rights-of-way may be affected by the proposed construction. Public utilities will require the review and approval of the City prior to submittal to the permitting agency.
 - 1.19. It shall be the developer's engineer and contractor's responsibility to verify the existence and location of all underground utilities and to utilize the MISS DIG system prior to construction.
 - 1.20. All site plans shall contain the latest version of the applicable Oakland County Water Resource Commissioner and the Road Commission for Oakland County (if applicable) detail sheets and the developers/owners name(s), address, and phone number. The plans must also contain the City's current Standard Utility Material Specifications table located on the City's Department of Public Works web page. Further, the City of Berkley Standard Construction Notes (included herein as Appendix A) must be reviewed for compliance.
 - 1.21. An Engineer's Opinion of Construction Cost (for both the overall project and for the
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proposed work within the City right-of-way) must be supplied with the Engineering Plan submittal. This estimate will be used by the City to establish set fees for the City Consultant including required field observation and plan review fees for the improvements in accordance with Article VI Section 2-282 of the City Ordinance and to determine the required amount of each construction bond.

- 1.22. Utility crossings of paved roadways will be required to be bored. Open cutting of paved roadways will not be permitted without prior approval from the City.
- 1.23. Under no circumstance will a new water main or sewer pipe be allowed to be installed within the footprint of an existing or proposed building. In addition, if an existing water main or sewer is within the footprint of a building that is proposed to be redeveloped or razed and reconstructed, a new utility must be relocated outside of the existing or proposed building footprint prior to construction with all costs being the responsibility of the Applicant/Developer.
- 1.24. An itemized quantity list will be required for all proposed utility improvements (water main, sanitary sewer, storm sewer, paving).
- 1.25. Site Plan Submittal and Review Process

Please refer to Article 15 of Chapter 138 Zoning Ordinance – SITE PLAN REVIEW PROCEDURES AND REQUIREMENTS – for details on the site plan submittal and review process for developments and redevelopments.

Detailed site plan review checklists, which include the information, specifications, and details required for engineering site plan submittals for commercial and residential developments, as well as-built/record drawing requirements, are included in Appendix B herein.

- 1.26. Pre-Construction Meeting

Once the approved engineering plans have been issued and two (2) complete hardcopy sets of plans have been provided to the City by the Developer, and prior to the start of any work on the site, a preconstruction meeting will be required between the Applicant/Developer, their consultants and contractors, the pertinent City departments and their Engineering Consultant. This meeting will verify that all relevant permits have been applied for, that the proper bonds and insurance are provided, and schedule for material testing and construction observation, as necessary. The following is a checklist of requirements for scheduling the pre-construction meeting:

<u>COMMERCIAL DEVELOPMENTS – PRE-CONSTRUCTION MEETINGS</u>	NA	INCLUDED	
		YES	NO
The following items represent a standard list of items that are required to be submitted to the City for review and approval prior to scheduling the preconstruction meeting:			
1. Set up escrow account with the City for construction engineering services. (City Engineering Consultant will provide the required amount prior to the meeting) *			
2. City Permits (site work, utility (right-of-way), site (private), lot split/combination, and Bond (right-of-way restoration bond, etc.) approvals			
3. Permit Approvals/Exemption letters from outside agencies – RCOC, OCWRC, MDOT, SOCWA, EGLE, etc.			
4. (New) easement document(s)/exhibit(s)			
5. Construction Schedule			
6. List of contractors/subcontractors			
7. Traffic Control/Maintenance Plan			
8. Bonds (Performance, Payment, and Maintenance & Guarantee) and insurance policies, including the Owners Contractors Protective (OCP). Each bond must be issued for the total estimated construction cost for ALL work within the public right(s)-of-way. **			
9. Stormwater maintenance agreement (draft document only) ***			

*The escrow amount is the estimated budget for the City’s engineering consultant’s services, which includes both administrative and field services, as follows:

- 1.26.1. The City Engineering Consultant will coordinate and conduct the preconstruction meeting for the project, including preparing and distribution of meeting minutes.
- 1.26.2. The City Engineering Consultant will provide field observation for the project including, but not limited to, utility placement and connections, and pavement, curb & gutter and landscape restoration. Inspector Daily Reports will be prepared and submitted to the City.
- 1.26.3. The City will provide review and recommendation for approval of the selected contractor’s required insurance and bonds (Performance, Maintenance and Guarantee, and Labor and Materials). The bonds must be in

the amount at least equal to 100 percent of the estimated construction cost (within the ROW or easement) as security for the faithful performance of this contract, for the payment of all persons performing labor on the project under this contract, for furnishing materials in connection with this contract, and to provide the City a guarantee that all completed work will be maintained and free from defects, faults, etc. for a period of one (1) year. This section will be updated as needed per work with the Berkley City Attorney on bonds, performance guarantees, etc.

****** Samples of the required bonds and insurance certificates are included in **Appendix C** herein.

1.26.4. The City Engineering Consultant will coordinate the necessary punch-list onsite meeting(s) and assist with the development of a punch-list.

1.26.5. The City Engineering Consultant will provide review and approval of the as-built/record drawings.

1.27. Maintenance Agreement

A maintenance agreement shall be required between the city and the owner for all vegetative, structural, and stormwater best management practices (BMPs) to be constructed on site. Stormwater facilities shall be maintained by the owner and shall be repaired and/or replaced by such person when such facilities are no longer functioning as designed. Records of installation and maintenance and repair shall be retained by the owner and shall be made available to the City upon request. The maintenance agreement shall be binding on all subsequent owners of land served by the stormwater management and facilities and shall be recorded in the office of the Oakland County register of deeds prior to the final approval of the City. If the stormwater management BMPs have not been adequately maintained, the City may notify the owner(s) in writing and require the necessary maintenance or repairs within 90 days of the written notice. Should the owner fail to comply with the provisions of this article, the City may, after giving reasonable notice and opportunity for compliance, have the necessary work completed and the owner shall be obligated to promptly reimburse the City for all costs incurred.

The city shall not issue final approvals until the applicant executes a stormwater site maintenance agreement, plan, and a proposed schedule for perpetual maintenance of the complete storm drainage/management system, in a form approved by city council.

******* The standard Stormwater Management Operations and Maintenance Agreement can be found in **Appendix G of the OCWRC Stormwater Engineering Design Standards**.

SECTION 2: WATER MAIN

2.1. General

- 2.1.1. If the proposed improvements include the construction of public water main, the developer shall submit a set of water main only plans (including the water main standard detail sheets) with a completed EGLE permit application for water supply systems. This information will be forwarded by the City's Engineer to the Southeast Oakland County Water Authority (SOCWA) who will then submit to EGLE for permitting. Please note the procedure may also include submission of the permit application via the current EGLE web-based permit portal system.
- 2.1.2. All water system improvements shall be designed in accordance with the current edition of "Recommended Standards for Water Works" (a/k/a Ten State Standards).
- 2.1.3. Water mains in new developments shall be installed from boundary to boundary in abutting roads and interior streets, and at other locations and sized as may be deemed necessary by the City for future extensions.
- 2.1.4. An itemized quantity list for all proposed water main construction must be included on the plans.
- 2.1.5. All public water mains must be located within a 20-foot-wide easement or public road right-of-way. Easements should extend 10 feet beyond any hydrant. Sketches and descriptions of both the parcel and easement will be required. The applicant shall execute the City's standard easement documentation including providing exhibits and legal descriptions.
- 2.1.6. If lead water services are encountered, the homeowner will be given a letter of notice by the City, and the resident must approve the replacement prior to any work on the private service.

2.2. *Design Requirements*

- 2.2.1. The distribution system in all developments requiring more than 600 feet of water main shall have a minimum of two connections to a source of supply and shall be a "looped" system. Water mains are to be looped whenever possible. The ability to serve at least 2,000 gpm in single-family detached residential; 3,000 gpm in apartment, cluster residential and similar complexes, institutional, and school areas; and at least 4,000 gpm in office, and shopping centers is essential.

- 2.2.2. Eight (8) inch minimum diameter mains will be installed in single family residential areas.
- 2.2.3. Twelve (12) inch mains are the minimum size in commercial, office, and multiple family residential areas except in a looped system of 1,500 feet or less where eight (8) inch mains may be permitted.
- 2.2.4. Hydrant leads longer than 20 feet must be eight (8) inches.
- 2.2.5. No service leads are allowed to extend from a six (6) inch hydrant lead.
- 2.2.6. Profile view is required for all sizes of watermains, or as per current EGLE requirements.
- 2.2.7. Water mains shall be kept on one side of the street for the entire length of the street. Water mains shall not be located under pavement or under cul-de-sacs.
- 2.2.8. Gate valves shall be spaced at a maximum of 800 feet intervals on distribution lines. They shall be spaced such that not more than four valves need to be turned off to isolate any section of the water main.
- 2.2.9. Sufficient valves shall be placed such that not more than 20 single family homes, 30 multiple family units or two (2) hydrants shall be out of service within a section of isolated water main.
- 2.2.10. Dead-end mains must end with a hydrant and a gate valve and well. All stubs for future looping must include a gate valve and well.
- 2.2.11. Gate valves should not be located under roadway pavement, bike paths, sidewalks or driveway approaches when possible.
- 2.2.12. Four (4) inch and larger valves are required to be installed in a gate well, except for six (6) inch hydrant shut off valves.
- 2.2.13. In single family residential areas, hydrants shall be spaced along the water main a maximum of 500 feet. In no case shall a house be more than 350 feet from a hydrant. Commercial, and multiple family spacing shall be a maximum of 400 feet.
- 2.2.14. Along major roadways and in areas other than single family residential, hydrant spacing shall be a maximum of 500 feet.

- 2.2.15. In commercial areas, the exterior of buildings shall be no further than 300 feet from a hydrant, nor closer than 35 feet, measured along shortest feasible exterior route for laying hose. There shall be a fire hydrant located within 100 feet of any building public safety connection.
- 2.2.16. Where possible, hydrants shall be located at the lot corners, but no closer than eight (8) feet from any driveway or driveway approach.
- 2.2.17. Hydrants located in parking areas shall be protected with a six (6) inches (minimum) concrete curb or standard guard posts.
- 2.2.18. When connecting to an existing water main, a tapping sleeve, gate valve and well will be required unless connection to the existing main can be made without interrupting service on the main.
- 2.2.19. The plans shall indicate the finish grades of all hydrants and gate well.
- 2.2.20. Water mains shall be located so as to provide a minimum of ten (10) feet horizontal clearance between the nearest edge of the water main and the nearest edge of any sanitary or storm sewer.
- 2.2.21. A minimum vertical clearance of 18 inches shall be maintained between the top or bottom of any water main and the top or bottom of any sewer or utility. Vertical clearance of less than 18 inches will require concrete bridge for the sewer or utility, in accordance with the WRC Standard Detail.
- 2.2.22. Restrained joints shall be used at all bends, tees, hydrant shoes, plugs and caps where necessary to prevent lateral movement of the water main. Thrust blocks will not be allowed unless required by the permitting agencies.

2.3. *Materials*

Materials shall be in accordance with the current City Standard Utility Materials Specifications (or approved equal), which can be obtained from the DPW.

2.4. *Installation*

- 2.4.1. All water main shall be installed with a minimum cover of five-and-a-half (5.5) feet below finish grade or top of curb (or road centerline if uncurbed)

where the main is parallel to a road. When water mains must dip to pass under another utility, the sections which are deeper than normal shall be kept to a minimum length by the use of vertical bends properly restrained.

- 2.4.2. The contractor will fill, disinfect, pressure test and conduct bacteria testing, in coordination with SOCWA, for all new water main construction under the supervision of City of Berkley and/or its agent.
- 2.4.3. Before any water main is accepted by the City, it must pass a pressure test complying with the current specifications and procedures of the City. The maximum loss of water for the 2-hour hydrostatic test shall be 11.65 gallons, per inch diameter of main, per mile of pipe over a 24-hour period.
- 2.4.4. The contractor will be responsible, in coordination with the City and SOCWA, for obtaining bacteriological analysis and testing by a laboratory approved by the State of Michigan. The testing must be done in accordance with ANSI/AWWA C65. The test results must be directly reported to the Owner and OCWRC.

SECTION 3: SANITARY SEWER

All construction must conform to the current Oakland County Water Resources Commissioner standards and/or as specified herein.

3.1. General

- 3.1.1. A separate and independent building sewer shall be provided for every building except when one building stands at the rear of another on an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, court, yard or driveway, the building sewer from the front building may be extended to the rear building and the whole considered as one building sewer.
- 3.1.2. Old building sewers and water services shall not be used in connection with new buildings. Remaining foundations not constitute an existing building.
- 3.1.3. All building sewer construction and the installation of pipes, fittings and appurtenances shall be done in accordance with the building regulations of the city, the city's utility connection policy and such supplementary rules and regulations as the Director of Public Works may prescribe, which shall be effective upon approval by the city council.
- 3.1.4. The applicant for the building sewer permit shall notify the Community Development Department when the building sewer is ready for inspection

and connection to the public sewer. The connection to the city main and any connections to the structure or there along shall be made under the immediate supervision of the Director or their designee.

- 3.1.5. If the proposed improvements include the construction of public sanitary sewer, the developer shall submit a set of sanitary sewer only (with sanitary standard details) plans with a completed EGLE permit application for wastewater systems. This information will be forwarded by the City's Engineer to the proper agencies for permitting.
- 3.1.6. All sanitary sewer improvements shall be designed in accordance with the current edition of "Recommended Standards for Wastewater Facilities" (a/k/a Ten State Standards). A sanitary sewer basis of design is required to be included on the plans for all sanitary sewer extensions.
- 3.1.7. A grease interceptor will be required for all food service operations. No connections for domestic waste will be allowed to the interceptor.
- 3.1.8. Downspouts, weep tile, footing drains, sump pump discharges, or any conduit, that carries storm or ground water shall be discharged to grade and shall not connect directly to any combined or sanitary sewer.
- 3.1.9. An itemized quantity list for all proposed sanitary sewer construction must be included on the plans.
- 3.1.10. Sanitary sewers will be required across the entire frontage of the site.
- 3.1.11. All public sanitary sewers must be located within a 20' wide easement or public road right-of-way. Easements should extend 10' beyond the last manhole. Sketches and descriptions of both the parcel and easement will be required. The documents shall contain a provision to prohibit the construction of any above ground structures within the limits of the easement. The easement width may be increased depending on the proposed sewer depth, soil conditions or adjacent facilities.

3.2. Design Requirements

- 3.2.1. At all connections to the City's Sanitary System or extension thereto, in the first manhole upstream from the connection, provide a water-tight bulkhead with a 1" diameter pipe through the bulkhead for measuring infiltration immediately upstream. Also, a one-foot sump at the base of the manhole shall be provided.
- 3.2.2. The minimum allowable size of a public sanitary sewer is 8" diameter.

3.2.3. The following table of minimum slopes and maximum manhole (MH) spacing for sanitary sewers shall be adhered to. Additional diameters and grades are provided in the Ten States Standards document.

<u>Diameter</u>	<u>Minimum Grade</u>	<u>MH Spacing (Min.)</u>
8"	0.40%	300 Feet
10"	0.28%	300 Feet
12"	0.22%	350 Feet
15"	0.15%	350 Feet
18"	0.12%	350 Feet
21"	0.10%	350 Feet
24"	0.08%	400 Feet

3.2.4. The last upstream run of sewer must be at a grade of 1.00% or greater.

3.2.5. The minimum slope for 6" diameter building leads is 1.00%. Cleanouts are required every 100 feet and at all bends.

3.2.6. A monitoring manhole is required on the sanitary lead for all non-residential connections to the sanitary sewer system. The monitoring manhole can only have one (1) lead running through it. It must be located on a straight run of lead and cannot be a manhole on a public sewer main.

3.2.7. Each building structure shall have a separate individual sanitary service lead connected to a public sanitary sewer.

3.2.8. Sanitary sewers will not be approved in the rear lot easement.

3.2.9. The following information shall be indicated on the sanitary sewer profile:

- a) Length of run between manholes.
- b) Type, class, size and slope of pipe.
- c) Class of bedding.
- d) Rim elevation of all manholes.
- e) Existing and proposed ground elevation line above the route of the sewer.
- f) A logical numbering system for manholes shall be included.
- g) Invert elevations of all sewer at manholes.
- h) Location and limits of sand backfill where required.
- i) Location and elevations of crossings with other utilities.

3.2.10. Under any design the sewer shall be deep enough to reasonably serve, by gravity, a standard depth basement.

3.2.11. Sanitary sewer shall be placed on the opposite side of the street from the water main and shall have a horizontal separation of at least 10 feet.

- 3.2.12. Per WRC Details, internal drop connections are required at manholes where the invert of the outlet pipe is 18 inches or more below the invert of the inlet pipe.
- 3.2.13. Where the proprietor must extend the sanitary sewer from off-site, the proprietor shall extend sanitary sewer leads to the property line of all adjacent property on both sides of the right-of-way the entire length of the off-site sanitary sewer extension.
- 3.2.14. In new subdivisions, all service leads shall be sand backfilled and extended a minimum of ten (10) feet past the property line or to the easement line, whichever is greater.
- 3.2.15. The plan and profile view of the proposed sanitary sewer shall generally be shown on the same sheet.
- 3.2.16. Maximum flow velocity for pipe flowing full shall be maintained by matching the eight-tenths point of the diameter depth above invert for pipe size increases.
- 3.2.17. Provide a drop of 0.10 feet in the downstream sewer invert for a direction change of 30 degrees or greater to compensate for velocity head loss of the incoming flow.
- 3.2.18. Service leads and common header pipes for multiple and commercial properties shall be a minimum of 6 and 8 inches in diameter, respectively, with a minimum slope of 1.0%.
- 3.2.19. Private sanitary sewer leads exceeding 100-feet, although not a public sewer, may require calculations, a profile plan, inspection and testing. Each site will be considered individually by the DPW and Community Development Departments.
- 3.2.20. All existing and proposed sewer service leads shall be clearly shown on the plans.
- 3.2.21. Proposed sewer service leads are regulated by the City of Berkley adopted plumbing code requiring a minimum of 1% slope. Proposed building sanitary sewer leads shall not be connected to existing or proposed storm drain systems or outlet pipes.

3.3. *Materials*

- 3.3.1. Service leads installed with the lateral sewer shall be a minimum of 6 inches in diameter and shall be Schedule 40 PVC or SDR 23.5.
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- 3.3.2. New sanitary sewer manholes must be water-tight and shall be pre-cast sections with modified grooved tongue joints with rubber gaskets, conforming to A.S.T.M. Designation, C-478. Also, a butel rubber coating around the casing and cone shall be provided for all new manholes as noted on the City 's or its agent's standard detail sheet.
- 3.3.3. Main line sewer shall be Solidwall SDR 26, or RCP, C-76, Class IV or V, or approved equal.

3.4. Installation

- 3.4.1. No sanitary sewer installation or portion thereof shall have infiltration exceeding 100 gallons per inch diameter per mile of pipe per 24-hour period.
 - 3.4.2. Each end of a service lead shall be marked by setting a 2" square wooden stake vertically above the end of the lead.
 - 3.4.3. Each tee or end of service lead shall have water-tight and airtight stopper of compatible joint material and shall be adequately braced to withstand exfiltration and/or air test pressure.
 - 3.4.4. When existing manholes are to be tapped, a hole of the appropriate diameter shall be core drilled through the wall of the manhole. A watertight fitting shall be used to connect the pipe into the manhole.
 - 3.4.5. At all times when laying of new pipe is not actually in progress, the upstream end of the pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until the danger of water entering the pipe has passed.
 - 3.4.6. A minimum of 30 days after installation and prior to acceptance, all sewers shall be subjected to infiltration, air or exfiltration tests, or a combination thereof, in accordance with the following requirements, prior to acceptance of the system by the City of Berkley and prior to removal of the bulkhead.
 - 3.4.7. All sewers over 24" diameter shall be subjected to infiltration tests. All sewers of 24" diameter or smaller, where ground water level above the top of sewer is over seven (7) feet, shall be subjected to an infiltration test.
 - 3.4.8. All sewers of 24" diameter or less, where the ground water level above the top of the sewer is seven (7) feet or less, shall be subjected to air tests or exfiltration tests.
 - 3.4.9. A minimum of 30 days after installation and prior to the acceptance of new
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mainline sanitary sewer systems, a televised inspection of each section of the mainline shall be conducted from manhole to manhole. Video and log of this inspection shall be submitted to the Community Development Department to document the current condition of the sanitary system at the time of the utility acceptance. The video and log shall be consistent with the Standards of the City of Berkley.

SECTION 4: STORM SEWER

All construction must conform to the current Oakland County Water Resources Commissioner standards and/or as specified herein.

4.1. Design Requirements

- 4.1.1. Storm sewer systems shall be designed for a ten-year intensity rainfall. The Rational Method for arriving at storm sewer runoff shall be used. An "n" value of 0.013 shall be used for concrete pipe.
- 4.1.2. The formula for a ten (10) year rainfall intensity shall be equivalent to $I = 175/(T+25)$ in which T is the time of concentration (minutes), and I is the intensity (inches per hour).
- 4.1.3. The initial T is generally 20 minutes for residential areas and 15 minutes for high runoff areas.
- 4.1.4. The consulting engineer shall use the following minimum values for "C", the runoff coefficient, in the "Rational Formula" of computing storm water flows ($Q = CIA$) or as per the current Oakland County standards.

Impervious Hard Surfaces	C = 0.90
Gravel Surface	C = 0.50
Vegetated/Turf Surface	C = 0.20

Other values of the runoff coefficient may be used or required at the discretion of the City's Engineer for such areas as parks and open-spaces or unusual sites.

- 4.1.5. Sufficient capacity shall be provided in the storm sewer system to take fully developed tributary upstream drainage into the system. When a storm sewer is designed to provide capacity for upstream areas, the hydraulic gradient shall remain in the pipe.
- 4.1.6. Storm sewer design calculations, including a drainage area map shall be included on the engineering plans. The storm district map shall show all on-

site and off-site drainage districts. A minimum 1" = 50' scale is allowed. The district limits must be overlaid on a proposed grading plan for the site.

- 4.1.7. All public storm sewers must be located in a public right-of-way or an easement. The minimum storm sewer easement shall be 12 feet. The easement size will vary as required for maintenance and access. Any storm sewer that accepts runoff from abutting property or public right-of-way must be placed in a minimum 12-foot storm sewer easement.
- 4.1.8. If a storm sewer is designed to take on-site drainage only, the hydraulic gradient must be no higher than one (1) foot below ground. When the hydraulic gradient is above the top of the sewer pipe, the design elevation of the hydraulic gradient shall be indicated on the profile at each manhole.
- 4.1.9. Storm water detention is necessary for all developments in the City. See Section 5, Storm Water Detention / Retention Facilities, for details.
- 4.1.10. Manholes shall be located as follows:
 - a) All changes in alignment
 - b) Points where the size of the sewer changes
 - c) Points where the grade of the sewer changes
 - d) The junction of sewer lines
 - e) Street intersections or other points where catch basins or inlets are to be connected.

4.1.11. Manhole and catch basin spacing for storm sewers shall be as follows:

<u>Diameter of Sewer</u>	<u>Maximum Spacing</u>
12" – 15"	400 ft.
18" - 21"	400 ft.
24" - 30"	450 ft.
36" & 42"	500 ft.
48" & larger	550 ft.

Spread calculations will be required to verify inlet spacing and ensure drainage coverage.

- 4.1.12. The minimum size of a public storm sewer is 12-inch diameter.
- 4.1.13. Connection must be made at manholes or catch basins. Blind taps are not allowed.
- 4.1.14. The following information shall be indicated on the storm sewer profile:

- a) Length of run between manholes.
-

- b) Type, class, size and slope of pipe.
- c) Class of bedding.
- d) Rim elevations of all manholes.
- e) Existing and proposed ground elevations above the route of the sewer.
- f) A logical numbering system for manholes shall be included.
- g) Invert elevations of all sewers at manholes.
- h) Locations and limits of sand backfill, where required.
- i) Locations and elevations of crossing with other utilities.

4.1.15. The following table of minimum slopes for storm sewers shall be adhered to:

Size and Minimum Slope

12" @ 0.48%
15" @ 0.36%
18" @ 0.28%
21" @ 0.23%
24" @ 0.17%
27" @ 0.16%
30" @ 0.15%
36" @ 0.12%
42" @ 0.12%
48" @ 0.10%

4.1.16. The minimum velocity may not be less than 3 feet per second in a pipe flowing full. The maximum velocity in storm sewers shall be ten (10) feet per second. The contents of a larger pipe will never be discharged into a smaller line even though the slope may be steeper for the smaller line. This principle does not apply, however, to a restricted opening or discharge.

4.1.17. Where possible provide a minimum of three (3) feet of cover from the top of curb (or road centerline) to the top of any storm sewer.

4.1.18. For subdivisions, storm sewers shall be located in the public road right-of-way or in easements adjacent to the public road right-of-way. Storm sewers shall not be located in rear yards except to pick up rear yard drainage or for sump pump discharge lines.

4.1.19. At all pavement catch basins and inlets, forty (40) lineal feet (twenty in each direction) of six (6) inch edge drain shall be constructed at the back of curb line in each direction, backfilled with pea gravel and includes fabric. Additional edge drain may be required as directed by the City Engineer. Public roads require edge drain along all new or replaced curb and gutter.

- 4.1.20. No more than 1.0 acre of area shall be tributary to one standard catch basin. Catch basins may be placed side by side to provide additional capacity. Detailed spread calculations shall be provided to ensure appropriate drainage coverage.
- 4.1.21. A maximum of 900 feet of drainage is allowed to any catch basin from two (2) directions.
- 4.1.22. Where lateral storm sewers are proposed, all new homes must be constructed with sump pumps which discharge to an underground pipe connected to an underground public rear yard drain or storm drain. The sump pump discharge lead shall be a minimum of four (4) inch diameter. The lead shall be constructed at a minimum 1.0% grade and connected to a structure. No blind taps are allowed.
- 4.1.23. The minimum grade for swales and ditches shall be 1.0%. All ditch slopes greater than 3.0% will require sod vegetation. Ditch slopes greater than 5.0% will require rip rap and/or check dams.
- 4.1.24. For residential developments and redevelopments, rear and/or side yard catch basin(s)/inlet(s) may be required unless stormwater drainage can be maintained on site and be positively directed and ultimately discharged to the nearest stormwater collection system in the City right-of-way/street via surface (ditch/swale/sheet flow) drainage.

4.2. Materials

- 4.2.1. Pipe for storm sewers within the public right-of-way or under any pavement shall be C-76 reinforced concrete pipe conforming to Classes IV or V, or PVC if approved by a geotechnical consultant and approved by the City. Special bedding and backfill will be required.
 - 4.2.2. Pipe outside the influence of the public right-of-way and outside of any pavement may be double-walled, High Density Polyethylene (HDPE) with smooth interior and annular exterior corrugation meeting requirements of ASTM F2306 if approved by a geotechnical consultant and approved by the City. Special bedding and backfill will be required.
 - 4.2.3. Joints for storm sewer shall be tongue and groove premium joints with rubber gaskets.
 - 4.2.4. All lead material shall be schedule 40 PVC.
 - 4.2.5. Storm manholes are to be a four-foot (4') diameter minimum with an eccentric cone. Catch basins are to be a minimum four feet (4') diameter
-

with a two (2) foot sump and an eccentric cone. There must be a 3-foot minimum to the top of the pipe but eccentric cones may require more than 3-feet. Inlets may be a two (2) foot diameter. All storm structures must conform to ASTM C-478.

4.3. Installation

- 4.3.1. All storm sewers shall be installed on Class II Sand bedding or better.
- 4.3.2. A prefabricated bar screen shall be installed on all storm sewer culvert end sections eighteen (18) inch in diameter and larger.
- 4.3.3. Refer to the standard detail sheets for additional material and construction standards.
- 4.3.4. HDPE sewers may require deflection testing with a nine-point mandrel a minimum of 30 days after installation. At no point will the pipe have out of round deflections greater than five (5) percent of normal pipe diameter.

SECTION 5: STORM WATER DETENTION / RETENTION FACILITIES FOR NEW SUBDIVISIONS, SITE CONDOMINIUMS AND COMMERCIAL DEVELOPMENTS

All construction and land activities must conform to the current Oakland County Water Resources Commissioner standards and/or as specified herein.

This article is intended to specifically apply to stormwater detention/retention which is a prevailing need where the absence of detention/retention could endanger the property, health, safety and general welfare of the residents and property owners of the city.

Further, the purpose of this article is to regulate the rate of stormwater runoff flow from land within the city in order to protect the public health and minimize the problems resulting from an overloading of the city sewer system.

For clarification, while stormwater detention and retention are both methods used to manage and control, or reduce the peak flow of stormwater runoff, helping to mitigate the impacts of stormwater runoff and reduce the strain on drainage systems, they serve different purposes. **Stormwater detention** involves temporarily holding stormwater and then slowly releasing it at a controlled rate to prevent flooding and erosion downstream as well as reducing the risk of damage to downstream infrastructure. Detention can be achieved by constructing detention basins/ponds, underground tanks, sewer pipe networks, or other structures designed to temporarily store stormwater. **Stormwater retention** involves the capture and storage of stormwater, allowing it to infiltrate into the ground or to evaporate over time, which can help to recharge groundwater and reduce the volume of stormwater entering the drainage system. Retention can similarly be achieved by constructing infiltration basins/ponds, bioretention areas, rain gardens, wetlands, underground tanks or storage pipe networks, or other structures designed to capture and hold stormwater.

5.1. **General**

- 5.1.1. Storm water detention/retention is required for all developments in the City.
- 5.1.2. Detention basins shall be designed to detain improved storm water over the developed areas on site. The applicant is not required to detain water from offsite areas in the drainage district.
- 5.1.3. All land activities shall comply with the current Oakland County Water Resources Commissioner (OCWRC) Stormwater Engineering Design Standards with the exception of the one (1) acre or greater requirement for stormwater management in that the City of Berkley requires all land activities regardless of size to be governed by OCWRC’s design standards unless otherwise described herein.
- 5.1.4. If the stormwater system is proposed to be a retention system with no outlets, the system will be required to hold two 100-year storms.
- 5.1.5. All projects are required to provide adequate sediment and erosion controls in order to ensure no offsite sedimentation collects transports into adjacent properties, sewer systems, and public rights-of-way, regardless of size.
- 5.1.6. Drainage from a new development, renovation or addition shall not be diverted onto abutting private property. Drainage from a new development, renovation and addition requiring detention shall be directed to the detention basin. Discharge from the basin and overflow shall not be diverted onto abutting private property.
- 5.1.7. The stormwater detention requirements for developments less than one (1) acre in area are as follows:

Detention Table for Commercial Developments and Residential Subdivisions and Site Condominiums with a parcel size of 1 Acre or less

Development Area (acres)	Detention Volume Required (Cubic Feet)	Maximum Outlet (CFS)	Minimum Outlet Requirements
0.91 to 1.00	8,000	0.97	4 - 2" Orifices
0.81 to 0.90	7,200	0.73	3 - 2" Orifices
0.71 to 0.80	6,400	0.73	3 - 2" Orifices
0.61 to 0.70	5,680	0.49	2 - 2" Orifices
0.51 to 0.60	4,780	0.49	2 - 2" Orifices
0.26 to 0.50	4,000	0.49	2 - 2" Orifices

5.2. ***Project Variances/Exceptions***

- 5.2.1. Developments, renovation or additions of less than 0.26 acres or 11,325 square feet in area will not require stormwater runoff detention/retention at the time of the improvement. For such case, a restrictive covenant must be executed by the property owner and recorded with the Oakland County Register of Deeds stating that when the next future improvement occurs on the property which will make the accumulated area of existing improvement and the future improvement greater than 0.26 acres or 11,325 square feet, the property owner will make the stormwater detention/retention improvements as specified in this article on the accumulated area.
- 5.2.2. The City shall have the authority to grant variances/exceptions to the detention requirements as contained within this section if the area of the proposed development is between 0.26 and 0.50 acres and upon reasonable written demonstration of practical and/or financial difficulty by the Applicant related to stormwater detention compliance and/or exceedance of the project budget which would cause the project to be delayed or abandoned. Circumstances may include limited buildable area, special zoning requirements, parking requirements, other site restrictions, etc. Regardless of any variance/exception granted, the City will maintain the minimum requirement for the Applicant to detain stormwater runoff from the proposed *improvement(s)* on the site.
- 5.2.3. Renovations and additions that do not involve parking lot, private street, drive or sidewalk removal and replacement, will not require stormwater runoff detention/retention at the time of the improvement, unless adequate undeveloped land is available for detention/retention on the property. If stormwater detention/retention is not included as part of the renovation, a restrictive covenant must be executed by the property owner and recorded with the Oakland County Register of Deeds stating that when the next future improvement occurs on the property under this article, the property owner will make the stormwater detention/retention improvements as specified in this article on the accumulated area.

5.3. ***Method Used***

The Oakland County Water Resources Commissioner (OCWRC) Stormwater Engineering Design Standards, subtitled the “Requirements, Rules, and Design Criteria for Stormwater management”, as made available by the Oakland County Drain Commissioner's office, shall be utilized in the design and implementation of all stormwater topics, including, but not limited to, determining the volume of detention/retention required; stormwater management; flood control; long term stormwater infrastructure maintenance; and low-

impact development (LID) techniques, or “green infrastructure” to reduce runoff and pollution, improve water quality, and promote soil conservation. The Planning Commission and City Council may determine alternate requirements as deemed necessary and advisable during the course of their special land use permit and site plan review process.

As per the OCWRC, underground detention facilities will be allowed on sites where traditional stormwater management measures are not feasible and will be evaluated on an individual basis. The underground facility must comply with all standards imposed on traditional facilities; including, but not limited to, a restricted outlet, overflow structure, overflow route, and a perpetual maintenance plan.

5.4. *Design Requirements*

- 5.4.1. Detention and retention facilities design shall follow the Oakland County Water Resources Commissioner (WRC) current Stormwater Engineering Design Standards. Developments that do not meet these requirements will, at a minimum, meet the standards in this section of the City of Berkley Engineering Design Standards.
- 5.4.2. Leaching systems may be designed with a maximum infiltration rate of six (6) inches per hour and store a volume equal to a 100-year storm. Sufficient data must be available to support the use of a leaching system. In no case shall the infiltration rate be greater than 0.2 cfs per acre. A form of sediment control must be provided with all leaching systems.
- 5.4.3. Sediment control system must provide 80% removal of the annual total suspended solids (TSS) based on a 100-micron particle size and treat 100% of the runoff from the 1-year/24-hour storm event. Rain events in excess of the 1-year/24-hour event must bypass the system without causing re-entrainment of floatable contaminants.
- 5.4.4. A minimum of 12 inches of freeboard must be maintained for all systems. All building openings must be above the freeboard elevation.
- 5.4.5. All basins shall be required to be designed to drain by gravity unless designed with a permanent water elevation. Detention basins designed to utilize pumps for dewatering will not be permitted.
- 5.4.6. Where a retention basin will be utilized, it is the developer’s engineer’s responsibility to provide documentation to confirm that the soils in the area of the basin can infiltrate at a minimum rate of six (6) inches per hour. In no case shall the infiltration rate be greater than 0.2 cfs per acre. This information shall appear on the engineering plans. A leaching basin will be

required for all retention systems unless the ground water level is within two (2) feet of the outlet.

- 5.4.7. All open detention basins must be fenced if the side slopes exceed 1 vertical to 5 horizontal. This may be waived by the City if the design of the basin is an integral part of the landscaping and the location and depth does not present a potential hazard. The maximum side slope for a basin with fencing shall be 1 vertical to 3 horizontal.
- 5.4.8. A 20-foot-wide access easement must be provided to all basins.
- 5.4.9. An agreement for the long-term operation and maintenance of detention / retention facilities must be completed by the developer and submitted to the City prior to final acceptance of the as-built record drawings.
- 5.4.10. Calculations for the runoff coefficients, detention volume and restrictor sizing shall be clearly shown on the proposed detention/grading plan(s).
- 5.4.11. Outlet detail or details shall be clearly shown on the plans. Restrictor size, type and location shall be clearly indicated on utility plans. The 100-year free overflow shall be clearly labeled with the appropriate calculations and details.
- 5.4.12. As built plans shall be provided for all detention areas. Plans shall clearly indicate sufficient site grades; water surface contours and revised calculations based on the as-built grades verifying that the required volumes have been met. Deficiencies in detention storage volume shall be addressed with plans to provide the required detention volumes.
- 5.4.13. The City of Berkeley will require approval prior to construction to alter or regrade any area that provides storm water detention storage (swale, pond, pipe system, paved surface, etc.) or provides freeboard for a detention system (berms, landscaping, curbing, walls, etc.) Upon completion of the site work, an as built plan will be required to verify the restricted outlet, site grading and detention storage volumes in comparison to originally approved grades and volumes. Storm Detention and Right-of-way work shall be completed and approved prior to the City signing off on any final occupancy permit or other approval.
- 5.4.14. One detention volume calculation shall be made for the entire site. Previous hard surface improvements that required detention or a lien shall be included in calculation. Cumulative hard surface improvements shall be shown on the plan and labeled accordingly with the areas of improvement and dates of construction.

- 5.4.15. The minimum size outlet pipe shall be 8” diameter. Manholes shall be provided at each connection to public sewers of 15” or less and at all pipe junctions 10” and larger.
- 5.4.16. Restrictors shall be sized to discharge at the appropriate rate. To minimize the potential for orifice clogging, the minimum size restricted orifice is 2” in diameter. All restrictors and their respective calculations shall be indicated on the plans. The total cumulative discharge from all restrictors shall equal the site total discharge.
- 5.4.17. The restricting outlet structure (manholes and catch basins) shall be 48” minimum diameter with a 2’ minimum sump, or approved alternative.
- 5.4.18. The City of Berkley shall retain the authority to approve/deny the construction of detention basins within public utility easements based on potential impacts to public utilities.
- 5.4.19. No structure shall be installed within a detention basin that may allow the circumventing of detained water storage. Detention basins shall not be installed above any utility structure, manhole, water gate well, electrical handhole, etc. or within the limits of trash enclosures or any building.

SECTION 6: GRADING FOR SUBDIVISIONS, SITE CONDOMINIUMS AND COMMERCIAL DEVELOPMENTS

6.1. *General*

- 6.1.1. A grading plan is required for all developments. Rear yard storm drainage systems are required for all residential development and redevelopment projects. Refer to Section 4: Storm Sewer herein and Chapter 26 – Article VII (Building and Building Regulations) of the Berkley Code of Ordinances.
- 6.1.2. The grading of the proposed development shall not create drainage problems, or make existing drainage problems worse, on adjacent property. If necessary, storm drains shall be extended to the adjacent property to alleviate drainage problems.
- 6.1.3. A building permit shall not be issued until a grading plan has been submitted to the City and approved.
- 6.1.4. A soil erosion permit is required for all earth disruption over 1.0 acre, or as

deemed necessary by the permitting agency. It is the responsibility of the developer to inquire with the appropriate agency regarding the necessity of a permit.

6.2. *Design Requirements*

- 6.2.1. First floor and basement (where applicable) elevations for each proposed structure or building shall be shown on the plans.
- 6.2.2. The grades of existing adjacent buildings, drainage structures and streets shall be shown. The actual surveyed grades of existing adjacent ground and yards shall be shown on a grid pattern up to a minimum of 100 feet from the property line. The drainage pattern of all adjacent existing land shall be indicated.
- 6.2.3. The grading plan shall be designed to ensure that if a failure or overflow occurs within the storm system, water will drain away in overland swales without flooding houses.
- 6.2.4. The finished grade shall be compatible with the grades of surrounding buildings, roads, yards and with the existing ground at the proposed house. Finished grade set below the crown of the road will require that all stormwater is intercepted and routed so that it does not adversely impact any buildings.
- 6.2.5. All existing and proposed ground grades are to be in tenths of a foot.
- 6.2.6. Rear yard swales shall be no longer than 400 feet before being intercepted by a catch basin and shall have a minimum grade of 1.0%.
- 6.2.7. The proposed side yard swale elevation shall be shown between all buildings. This elevation must be a minimum of 0.5 feet below the lower adjacent house grade. The side yard swale must have a minimum slope of 1.0% to the front and rear.
- 6.2.8. General direction of flow of the rear yard drainage and swales must be indicated with arrows.
- 6.2.9. The maximum allowable side slope grade shall be 1 vertical to 4 horizontal.
- 6.2.10. The proposed ground elevations shall be indicated at each lot corner and top of curb or edge of pavement.
- 6.2.11. The maximum driveway slope is 8.0%. The slope of the driveway shall be

labeled on the plans.

- 6.2.12. Proposed retaining wall designs will require review by the City's Consulting Engineer at the City's discretion.

SECTION 7: PAVING & PRIVATE ROADS

7.1. *General*

- 7.1.1. For both public and private roadways proposed in the City, the City of Berkley, in conjunction with the Road Commission for Oakland County's design standards for subdivisions will be utilized as the basis for the design unless modified in this section.
- 7.1.2. Alternative paving designs for private roads/driveways may be submitted to the City for consideration at the time of Site Plan Review. They will be reviewed by the City's Consulting Engineer and recommendations will be made to the City. Such alternative paving designs 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 are consistent with other paving in similar areas elsewhere in the City.
- 7.1.3. For roads under the jurisdiction of the Road Commission for Oakland County (RCOC) or the Michigan Department of Transportation (MDOT), all improvements shall be designed to meet their requirements.
- 7.1.4. Acceleration, deceleration and passing lanes designed in accordance with RCOC/MDOT standards are required at all road entrances that front on paved major roads unless waived by the RCOC/MDOT.
- 7.1.5. Alternate horizontal and vertical alignments may be considered with written approval from the City Public Safety Department.

7.2. *Design Requirements*

- 7.2.1. The minimum outside radius of a cul-de-sac (back of curb) shall be fifty (50) feet. The back of curb inside radius shall be twenty (20) feet. All right-of-way radii shall be sixty (60) feet minimum.
- 7.2.2. Alternate horizontal and vertical alignments may be considered with written approval from Public Safety.
- 7.2.3. Roadways shall have a minimum of two (2) 12-foot lanes with curb and gutter or 28-foot- wide back of curb to back of curb.

- 7.2.4. A boulevard section may be allowed in an enlarged right-of-way. Pavement widths shall be at least twenty-four (24) feet for all boulevard streets (back of curb to back of curb). The distance from the property line to curb shall be sixteen (16) feet on boulevards. The minimum island width shall be ten (10) feet and maximum sixteen (16) feet. The nose of the boulevard island shall be set back at least twelve (12) feet from the edge of pavement of the intersecting street.
- 7.2.5. Vertical curves are necessary when a change in grade of 1.0% or more occurs. The minimum length of vertical curve shall be 100 feet.
- 7.2.6. The minimum pavement vertical grade for roadways shall be 0.40% when concrete curb and gutter is provided, 1.0% with open ditch and the maximum allowable grade on any roadway is 8.0%.
- 7.2.7. The maximum cross slope on a cul-de-sac is 3.0%.
- 7.2.8. All proposed roadways shall be profiled. The pavement profile view shall include:
- 7.2.9. Elevations at each station for the top of curb, or at centerline if not curbed.
- 7.2.10. Existing ground elevations at the center of the right-of-way, and 30 feet either side of the centerline.
- 7.2.11. Station and elevations of all high points, low points, grade-breaks and necessary information at vertical curves. Grades for vertical curves must be indicated at twenty-five (25) foot intervals.
- 7.2.12. The station and top of curb grade of all pavements catch basins and inlets.
- 7.2.13. The pavement radius at all intersections of all roads shall be a minimum twenty-five (25) feet.
- 7.2.14. Finish grade of all structures shall be indicated in the plan and profile views.
- 7.2.15. The minimum pavement cross-section for a residential road is four (4) inches of hot mixed asphalt (HMA) on eight (8) inches of aggregate. A thicker HMA, or possibly a nonreinforced six (6) inch to eight (8) inch concrete section, may be required by the City depending on the average daily traffic volumes as well as percentage of truck traffic. Additional layers and types of aggregate may be required depending on the type and condition of the

subsoils determined during the geotechnical investigation when pavement cores and soil borings are extracted. Pavement designs, based on geotechnical investigation and recommendation, shall be submitted for review by the City's Consulting Engineer at the City's discretion.

- 7.2.16. The minimum commercial parking lot pavement cross-section is four (4) inches of hot mixed asphalt on eight (8) inches of aggregate or six (6) inches of concrete on six (6) inches of aggregate Thicker cross sections (either or both the pavement and the aggregate section) for commercial parking lots may be required depending on the underlying soil conditions and/or as directed by the City.
- 7.2.17. All sidewalks are to be concrete and a minimum of four (4) inches thick on four (4) inches of Class II sand. Sidewalk ramps and sidewalk flags that cross driveways must be six (6) inches thick.

7.3. *Materials*

- 7.3.1. The subgrade material for paved private roads and parking lots shall be 21AA crushed concrete or limestone aggregate or as deemed necessary by the Developer or the City and/or its Consulting Engineer.
- 7.3.2. The HMA mix for private roads and parking lots shall meet current MDOT standards.
- 7.3.3. Concrete shall be mixed, placed, tested and cured as per current MDOT standards.

7.4. *Installation*

- 7.4.1. The installation of private roads and parking lots within the City may require inspection by the City Department of Public Works and/or the City Consulting Engineer at the following stages:
 - a) After the sub grade has been rough cut to the plan elevation.
 - b) After the placement of the aggregate base or aggregate roadway surface.
 - c) Full-time during the placement of the pavement (where applicable).
 - d) After all the required vegetation has been established.

Appendix A

CITY STANDARD CONSTRUCTION NOTES

The following notes shall be placed on ALL engineering plans. They may be modified when appropriate.

City of Berkley Standard Construction Notes

1. A preconstruction meeting must be scheduled with the City of Berkley Department of Public Works (DPW) prior to the start of construction (schedule, insurance, bonds, info. flyer).
2. The DPW and/or City's Engineering Consultant will complete site inspections for all work within the City right-of-way or along public utility corridors. Please contact the DPW a minimum of two days prior to commencement of any site work at 248-658-3490.
3. The City recommends the applicant and/or contractor video or photograph the project area prior to the start of construction as documentation of existing conditions.
4. All existing gate valves and hydrants are to be operated only by the City's Department of Public Works personnel. At no time shall the Contractor operate these facilities himself. The Contractor shall contact the Department of Public Works a minimum of 48 hours in advance of the need to schedule these activities and operations.
5. Use of a public fire hydrant will require a City meter with appropriate backflow prevention. Arrangements must be made with the DPW prior to construction. The current fee can be obtained at the City's Department of Public Works and is adjusted periodically.
6. The contractor shall take appropriate measures to protect public and private trees in the work area as detailed in Section 130-44(d) of the City Code. Any damage to trees shall be reported to the City.
7. The work area must be kept clean and dust free. Contractor will provide street sweeping as necessary.
8. Concrete trucks will not be permitted to wash out into the City's combined sewer system or catch basins.
9. Two-way traffic must be maintained for any work within the public roadway with traffic control devices in place according to the MMUTCD, latest edition.
10. Temporary road repairs must be checked and maintained on a daily basis.
11. Existing pavement shall be removed at existing joints and sawcut full depth prior to removal.
12. Compacted sand backfill meeting MDOT Granular Material, Class IIA requirements will be required for all trenches and excavations on this project, and acceptable backfill material meeting all specified requirements is expected to be imported for this use. All backfill is to be placed and compacted to a 95% maximum density regardless of whether the area is within the roadway or the greenbelt.
13. New concrete pavement shall match existing cross section - minimum 6" thick on a compacted 21AA aggregate base with epoxy coated #5 (1") dowels, 18" long, grouted in place, 12" on center on all sides. Further, full length dowels are to be installed through the

curblines. Placement of concrete below 40 degrees Fahrenheit will not be accepted.

14. It is the responsibility of the contractor to call MISS DIG at least three (3) days prior to job start.
15. The contractor is responsible for all damage to public utilities, pavement, curb, curb and gutter, and sidewalk in the public right-of-way.
16. All soil erosion and sediment must be controlled and contained on site. All public drainage structures requiring cleaning shall be completed prior to final inspection by the City.
17. City will require certification of the constructed storm detention system by way of a signed/sealed letter by the Applicant/Developer's Design Engineer. It is assumed that the Design Engineer will be in the field during this phase of construction, in particular, so they can confirm it was properly constructed.
18. ADA compliant ramps with detectable warning (Brick Red color, ADA Solutions or approved equal, 24" x 48") are required for any ramps disturbed during construction.
19. Trash collection shall not be interfered with by the Contractor's operations.
20. ADA Detectable Warning Surface Plates must be in accordance MDOT standards.
21. The Contractor must install temporary fencing to protect the public from equipment and any open excavations, as required, and around the trees that are to remain, prior to construction. Refer to Chapter 106, Article VII, Section 106-304 for fencing requirements.
22. Silt sacks are to be installed in all drainage structures prior to the start of construction and be in place for the duration of the project to aid in prohibiting debris from entering the sewers.

Appendix B

SITE PLAN (FINAL/ENGINEERING) REVIEW CHECKLISTS

1. ENGINEERING (COMMERCIAL DEVELOPMENTS)
2. ENGINEERING (RESIDENTIAL DEVELOPMENTS)
3. "AS-BUILT" REQUIREMENTS

Project Name: _____
SDA Project Number: _____
Reviewed By: _____

City of Berkley

Tentative Site Plan Review Checklist:

References for additional information:

Berkley Engineering Standards J:\BK\BKGEN\Ordinances & Processes
Berkley Standard Construction Notes J:\BK\BKGEN\Ordinances & Processes

(See Berkley Engineering Standards page 1 for the additional 11 references)

As-Builts

Review existing as-built site information from the following folder: J:\BK\As-Built Plans. Save a copy of any as-builts relative to the proposed development within an "As-Builts" folder in the Site Plan review.

Cross check as-builts with information in the GIS once this feature is made available to ensure no conflicts.

General

- Note the location of the proposed development, total site acreage, existing site use, and proposed site use.
- Note any proposed site changes (i.e. lot split/combination, environmental impacts)

Water Main

- Note the location and size of any existing watermain located on or within the surrounding areas of the proposed development.
- Note the location and size of proposed watermain in the proposed development.
- Note if the water main is private or public. All public water main outside of the roadway ROW will need to be accompanied by a 20-foot easement.

Sanitary Sewer

- Note the location and size of any existing sanitary sewer located on or within the surrounding areas of the proposed development.
- Note the location and size of proposed sanitary sewer in the proposed development.

- Note if the sanitary sewer is private or public. All public sanitary sewer outside of the roadway ROW will need to be accompanied by a 20-foot easement.
- Leads shall be abandoned and the proposed sewer lead must include a new connection as approved by DPW.
- If no proposed sanitary sewer is shown, provide the following statement. "CCTV inspection footage must be provided to confirm whether the existing sanitary sewer lead may be reused or if replacement is necessary during engineering review."

Storm Sewer / Site Grading

- Note the location and size of any existing storm sewer located on or within the surrounding areas of the proposed development.
- Note the ultimate drainage outlet for stormwater management on site. Storm water detention/retention is required for all developments in the city. Except if less than 0.26 acres or 11,325 square feet in area.

Site Paving

- Note the location and size of any parking areas, driveways, truck docks, and overall traffic circulation.
 - If there are concerns about traffic circulation around the site, request a vehicle turning plan for either the largest delivery vehicle on site or at a minimum, garbage trucks and emergency vehicles.

Preliminary Engineering Review

The following information is to be included in the plan set. If any information is missing, note in this checklist and make note in the review letter under the specific topic above.

- Provide the following note: "Provide the cost estimate for construction of all the underground utilities and paving and grading to be installed with this project. The engineering review and construction inspection fees that we will compute based on the said estimate must be submitted to the City of Berkley prior to engineering plan review and approval."
- Applicable WRC Standards Details must be included on the plans.
- Applicable RCOC Standards Details must be included on the plans
- The City of Berkley Standard Details must be included on the plans.

General Information

- The name, address and telephone number of the property title owner/developer.
- The professional seal and signature, name, address and telephone number of the person or firm preparing the site plan.

- The name and address of the proposed project.
- Scale, north arrow and date of preparation on all civil plan sheets, including any revision dates.
- The legal description of the property, including sidwell number, as determined by an existing title policy or a recent boundary survey. Acreage parcels shall be described in metes and bounds. Platted lots shall be described by lot number(s) and liber and page.
- A location or vicinity map showing the site location in relationship to streets, major thoroughfares, drainage courses or bodies of water, railroad lines, section lines, etc. The vicinity map shall include the existing zoning and land use within the boundaries of the site and properties abutting the site.
- The zoning of the subject property and the adjacent properties.
- A detailed narrative description of the proposed use of the property must be placed on the Tentative and Final Site Plan drawing which clearly describes the nature of the activity and operational functions of the proposed use, both on and off site. This should include proposed maximum number of employees and maximum number of employees to be employed at any given shift, proposed hours of operation, etc.
- A note indicating any variances previously received.
- If the proposed site described in the Tentative Site plan is part of a larger parcel, indicate the boundaries of the total parcel as well as the boundaries of proposed development area. In addition indicate the projected use of the remaining portions of the parcel.

Existing Conditions

- Gross acreage of the site to the nearest tenth of an acre.
- Net acreage of the site to the nearest tenth of an acre.
- All property lines fully dimensioned, as per the legal description.
- The existing and proposed road right-of-way, including the centerline of the road, dimensioned.
- The street setback line delineated, as per the Zoning Ordinance.
- Topographic survey indicating all existing topography consisting of
 - 1) Existing grades on a 50' x 50' grid to a minimum of 100' beyond the site's property lines with sufficient intermediate grades to determine the location of ditches, swales, and top or bottom of banks, adjacent pavement, finish grade of buildings, inverts of culverts, centerline and edge of roadways.
 - 2) Existing structures, sidewalks, buildings, paved and gravel parking areas and driveways both, on-site and to 100 ft. beyond the site's

property lines.

- 3) Location and/or size and depth(\pm) of all existing sewer, water (to include fire hydrants), gas, phone and electrical utilities both on-site and adjacent to the site. (All manholes, catch basins, etc. shall be shown with rim and invert elevation.)
- 4) Verification of ownership of all existing utilities is to be made.
- 5) All existing (recorded) easements for utilities and/or rights-of-way.

- The location of any 100-Year Floodplain and floodway locations present on the subject property, or within 50 feet of the subject property, shall be shown by contour line. If not present, then a note to that effect must be provided.
- The location of any known or anticipated wetlands present on the subject property, or within 50 feet of the subject property, shall be shown. If not present, then a note to that effect must be provided.

Engineering Information

- The proposed grade elevations showing all high points, low points, and grade changes on the site, including the grades of the property corners and along the perimeter of the site. In addition, the finish grades of the building corners, driveways, sidewalks, parking areas, culvert inverts, ditch or swale lines, and along the right-of-way, must be shown and must be clearly differentiated from existing grade elevations by underlining, boxing, or some other means.
 - 1) Slope grades are to be provided on the grading plan.
- Schematic layout of the location and/or size and depth of all proposed water, gas, telephone, and electrical utility lines, and associated structures, both on-site and adjacent to the site.
- Proposed pavement specifications and/or cross-section detail.
- Acceleration, deceleration, and passing lanes and tapers on major thoroughfares, as required by MDOT or Road Commission for Oakland County (RCOC).
- Written detailed cost estimate for the construction of the proposed sanitary sewer or water main.
- On site pavement, water main, sanitary sewer and storm sewer and quantities must be shown on the plans.
- Gross acreage of the site to the nearest tenth of an acre.
- Net acreage of the site to the nearest tenth of an acre. In the case of an office, commercial, multiple family or industrial use, the net acreage shall be exclusive of the street setback area as defined in the zoning ordinance. In the case of an R.U.D., Cluster Housing, or a P.U.D. see the specific sections in the Zoning Ordinance.

- Parking lot layout showing dimension of parking bays (width and length) and maneuvering lanes.
- Location and dimension of barrier free parking spaces and barrier free ramps. Barrier free parking spaces should be located in close proximity of the proposed barrier free ramp.
- Loading and unloading space and service and/or stacking space if required. Illustrate or provide a narrative on the Plan indicating the general method of delivery that will be conducted without impacting operational functions of the proposed use. All such spaces must be dimensioned.
- General explanation and indication of how the site will be serviced with utilities, (sewer, water, gas, telephone and electrical). Proposed locations of new water, (including fire hydrants, if any), sewer and storm drainage lines should be indicated, (line size, if known, would be helpful, but are not mandatory).
- General description of method of storm detention if required.
- Delineation on the plan of all distances from the property line to existing and/or proposed structures.
- One hundred (100) year floodplain and flood way locations shall be shown, by contour line, if present, on the subject site or within 50' of the site boundaries. If not in the floodplain, then note this on the plan.
- Location of any known or anticipated wetlands present on the subject site, or within 50' of the site.
- Location and height of any existing or proposed screen walls, berms, etc.
- Provide the location and size of all proposed greenbelt areas.
- No landscaping will be permitted within the watermain easement or sanitary sewer easement.
- Provide the location of all proposed structures. All structures shall be dimensioned, and gross floor area indicated. All structures shall be dimensioned from all property lines and distance between buildings shall be provided.
- Provide the location of all solid waste storage areas and pick-up points. Indicate method of collection to be used and type of screening proposed.
- Location of all existing pavement (identify type) and curbs (identify type.) to remain and all proposed pavement (identify type) and curbs (identify type.)
- If no proposed sanitary sewer is shown, note that existing leads which will be re-used must be inspected by a licensed contractor/plumber and the video footage submitted to the City of Berkley verifying the lead is suitable for re-use prior to construction.

The following information may be included on the plan set but is not required for final approval.

- Detailed engineering drawings including the following information (*Detailed engineering drawings are not required at the Tentative Site Plan Review phase, but are required for Final Site Plan Review*):
 - 1) The length, size, and slope of the pipe to be used for each of the proposed storm sewer, sanitary sewer, and watermain lines.
 - 2) The type of pipe to be used for each of the proposed storm sewer, sanitary sewer, and watermain lines.
 - 3) The rim and invert elevations of all proposed structures for each of the proposed storm sewer, sanitary sewer, and watermain lines.
 - 4) The invert elevation at the building and at the point of connection for the main sanitary sewer line.
 - 5) The bedding and backfill requirements for each of the proposed storm sewer, sanitary sewer and watermain lines.
 - 6) The profile views of all proposed storm sewer, sanitary sewer, and watermain lines.
 - 7) The depth of the lead at the easement or right-of-way line from the final grade.
 - 8) Indication of the proposed water service to the building, and a notation of the size.
 - 9) Location of fire hydrants and gate valves.
 - 10) Storm sewer calculations must be provided for all sites.
 - 11) The "City of Berkley Engineering Design Standards, Notes and Details" sheets.
 - 12) Soil erosion and sedimentation control measures.

- Written description of utility easements.

- Note the size and cover type of proposed storm sewer and sanitary sewer structures on plan.

- Provide 20 feet clearance from centerline of watermain to outside edge of any structure.

- Location and width of access drives and abutting streets. It is noted that all streets in the City of Berkley are under the jurisdiction of either the Michigan Department of Transportation (MDOT) or the Road Commission for Oakland County (RCOC) or the City of Berkley. Prior to final site plan approval, a letter from the jurisdiction having authority will have to be submitted. The letter should indicate the approval of the location and geometrics of any proposed egress/ingress. This is not a requirement for tentative site plan approval but will be required prior to final site plan approval. This process can take some time, therefore, the applicant is advised to contact the authority having jurisdiction as soon as possible to avoid delays at the time of final site plan approval.

Permits/Items Required

- Soil Erosion and Sedimentation Control Detail Sheet and copy of Water Resources Commissioner (WRC) Permit
- Copy of WRC Drain Tap Permit
- Water main and sanitary sewer easements.
- Copy of Road Commission for Oakland County (RCOC) Permit, if required.
- Copy of Road Commission for Michigan Department of Environment, Great Lakes and Energy (EGLE) Permit
- Stormwater maintenance agreement (draft document only)
- Southeastern Oakland County Water Authority (SOCWA) Permit or Exemption Letter
- A Letter of Map Revision must be requested through Federal Emergency Management Agency (FEMA) for the Flood Insurance Rate Map (FIRM) where portions of 100-year floodplain limit is proposed to be relocated, if applicable.
- Copy of Michigan Department of Transportation (MDOT) Permit
- All pertinent City Permits (building, utility, right-of-way, site (private), lot split/combination) along w Bond (right-of-way restoration Bond, etc)
- New easement document(s)/exhibit(s)
- Traffic Control/Maintenance Plan
- Construction Schedule
- List of contractors/subcontractors
- Bonds (Performance, Labor & Material and Maintenance and Guarantee) and insurance policies, including the Owners Contractors Protective (OCP) Each bond must be issued for the total estimated construction cost for ALL work done within the public right-of-way

**SDA ENGINEERING REVIEW CHECKLIST
CITY OF BERKLEY**

PROJECT NAME _____ **SDA No.** _____

REVIEWED BY: _____ **DATE:** _____

<u>I. General Review Items, Including General Plan (if applicable)</u>	<u>Yes</u>	<u>No</u>
1. Note the location of the proposed development, total site acreage, existing site use, and proposed site use.	_____	_____
2. Engineering plans match the approved site plan or tentative plat.	_____	_____
3. Plans submitted on 24" x 36" and are legible	_____	_____
4. Plans signed and sealed by a Professional Engineer (cover sheet).	_____	_____
5. Title block information filled in (i.e., project name, location etc.).	_____	_____
6. Location sketch.	_____	_____
7. North arrow.	_____	_____
8. Legal description of all properties involved in project provided.	_____	_____
9. Berkley and OCWRC Standard Notes on plans.	_____	_____
10. Street names and R.O.W. widths (existing or proposed).	_____	_____
11. All existing and proposed municipal and private utilities shown, maintaining adequate separation between all utilities.	_____	_____
12. Existing easements shown.	_____	_____
13. Location of proposed buildings on property.	_____	_____
14. Location and elevations of ditches, culverts, natural waterways, and county drains.	_____	_____
15. Lot numbers and dimensions or tract acreage shown.	_____	_____
16. Adjacent flood plain area shown. (If not in the floodplain, a note should be provided)	_____	_____
17. Plan views 1"=20' to 1"=50'	_____	_____
18. Profiles vertical scale 10X horizontal scale	_____	_____
19. A copy of boundary survey or plat.	_____	_____
20. Minimum two benchmarks	_____	_____
21. Note areas where a basement is to be located for any proposed building	_____	_____
22. Check Quantities Profile and Plan View for all utilities	_____	_____
23. Confirm all utility crossings are shown (lead and mains)	_____	_____
24. Include note requiring MISS DIG to be contacted prior to construction to have the existing Utilities located.	_____	_____
25. Demolition plan must be included.	_____	_____
26. Utility crossing of paved roadways shall be bored. No open cutting	_____	_____

- d. Peak flow calculated with the following formula:

$$\text{Peak Flow} = \left[\frac{(18 + \sqrt{TP})}{(4 + \sqrt{TP})} \right] \times \text{Avg. Flow}$$
 where TP = (pop.)/1000
- e. Permit application completed. _____
- 9. 20' minimum easements shown for all public sewers. _____
- 10. Berkley's standard detail sheet with construction notes. _____

III. Water Main

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 1. Profile view is required for all sizes | _____ | _____ |
| 2. Two water main supplies to serve each residential property having more than 30 living units. | _____ | _____ |
| 3. Water Main Location: | | |
| a. For easements: within middle third of width. | _____ | _____ |
| b. 10' min. separation from adjacent utilities | _____ | _____ |
| c. 20' min. separation from buildings | _____ | _____ |
| d. Location dimensions shown. | _____ | _____ |
| 4. Hydrants: | | |
| a. Spacing: 500' maximum single family. | _____ | _____ |
| b. Location: min. 5' from driveways, 30' from buildings, 350' from houses
Min. of 4' from edge of pavement or protected w bumper posts
Located at intersections 15' from right-of-way corner
400' commercial and multiple family
Min of 3' and max of 5' from back of curb. | _____ | _____ |
| c. Show finished grade for all hydrants. | _____ | _____ |
| 5. Gate Valves and Wells: | | |
| a. Spacing: 600' maximum. 800' | _____ | _____ |
| b. Location: outside of pavement if possible. | _____ | _____ |
| c. Location: 5' from right-of-way corners | _____ | _____ |
| d. Gate well size: minimum 5' diameter. | _____ | _____ |
| e. Show finish grade for gate well rims. | _____ | _____ |
| f. Tapping sleeve, valve and well at connection to existing water main, except if proposed water main is equal to or greater than the existing water main diameter.
Hydra-stops | _____ | _____ |
| 6. For dead-ends, provide hydrant and gate valve.
No dead-ends allowed for new sites (commercial, multi-family) | _____ | _____ |
| 7. For cul-de-sacs: | | |
| a. Water main must be located around cul-de-sac and adjacent to or in front of lots to be served. | _____ | _____ |
| 8. Provide max 45 degree horizontal bends or less (no 90 degree bends) | _____ | _____ |
| 9. Provide max 22½ degree vertical bends or less. | _____ | _____ |
| 10. Min 5.5', max 7' cover over WM pipe. | _____ | _____ |
| 11. 20' minimum easement shown for all public water mains. | _____ | _____ |
| 12. Quantities and description of improvements of public water main with city name, section number, and existing main roads near the project. | _____ | _____ |
| 13. Special backfill shown and labeled on plan view where water main is under the influence of pavement. | _____ | _____ |
| 14. Berkley's standard detail sheet attached to plans. | _____ | _____ |
| 15. Type of Connection to Existing Main is noted on the plans | _____ | _____ |
| 16. Utility Crossings Noted in Plan view | _____ | _____ |
| 17. Watermain pipe sizes: | | |
| a. 8" min for public watermain. 12" min in commercial, office and multiple family | _____ | _____ |
| b. 4" min for private watermain (except for MHP, ...etc.) | _____ | _____ |
| c. 6" hydrant leads (8" for leads 100' and longer) | _____ | _____ |
| 18. Berkley Note: If lead or galvanized material is encountered on either the private or Public side of a water service line, the entire service must be replaced from the main to the building's meter to comply with the State's current Lead and Copper Rule (LCR) | _____ | _____ |

IV. Storm Sewer

Yes No

- | | | |
|---|-------|-------|
| 1. 10' min. separation from buildings | _____ | _____ |
| 2. Provide catch basins (with 2' min. sumps) at low points. | _____ | _____ |
| 3. MHs placed at change in grade, direction, or pipe size. | _____ | _____ |
| 4. MH spaced at maximum as follows: | | |
| a. 12"-15": 400 LF | | |
| b. 18"-21" 400 LF | | |
| c. 24"-30" 450 LF | | |
| d. 36" & 42" 500 LF | | |
| e. 48" & larger 550LF | _____ | _____ |
| 5. Catch Basin w/2' sump as first structure upstream of storm outlet | _____ | _____ |
| 6. Provide intercepting catch basins so there is not more than 150' of drainage around curb returns. | _____ | _____ |
| 7. Show Utility Crossing Information in Plan View | _____ | _____ |
| 8. Provide plan showing drainage districts and furnish design calculations -- based on 10-year storm; use the following imperviousness factors for zoning classification: | | |
| (a) Single family = 0.35; (b) Multiple family = 0.55; | | |
| (c) Industrial = 0.80; (d) Commercial = 0.90 | _____ | _____ |
| 9. Detention meets Oakland County Standards. | _____ | _____ |
| 10. Storm sewer size and type: | | |
| f. Minimum 12" for surface drainage, 8" allowed if only serving sump-pump connections. | _____ | _____ |
| g. Sized for upstream areas. | _____ | _____ |
| h. Use class of pipe necessary for depth. | _____ | _____ |
| i. RCP CL IV and HDPE | _____ | _____ |
| 11. Show sump pump connections to storm sewer | _____ | _____ |
| 12. Storm Sewer Profiles: | | |
| a. Length, type, class, slope & size of pipe | _____ | _____ |
| b. Structure Number & Rim Elevations and Inverts at MHs | _____ | _____ |
| c. Provide at least 3' of cover; drop inverts at least 0.1' at sewer size changes or 90° turns. Show hydraulic gradient when it is above top of pipe; keep H.G. at least two feet below profile's finish grade. | _____ | _____ |
| d. Show all crossing underground utilities (existing or proposed). Maintain 18" vertical clearance. | _____ | _____ |
| e. Provide sufficient slope to get at least 2.5 FPS velocity (max 10 FPS) 3 FPS MDOT 12" @ 0.32, 15" @ 0.24, 18" @ 0.18, 21" @ 0.16 0.14, 24"@.12%, 27"@.10%, 30"@.09%, 36"@.07%, 42"@.06%, 48"@.05% | _____ | _____ |
| f. Sanitary building-service connections clear storm sewer. | _____ | _____ |
| g. Show top of pavement. | _____ | _____ |
| h. Existing and proposed ground elevations. | _____ | _____ |
| i. Class or type of bedding. | _____ | _____ |
| 13. Storm Sewer Location: | | |
| a. For easements: 2' off property or R.O.W. line in middle third of width. | _____ | _____ |
| b. 10' min. separation between adjacent utilities. | _____ | _____ |
| c. Location dimensions shown. | _____ | _____ |
| 14. Storm sewer manholes (assign number to each): | | |
| a. Location: at end of line and at all changes of grade, direction, and/or pipe size. | _____ | _____ |
| b. Size: minimum 4' diameter. | _____ | _____ |
| c. Spacing: 400' max. | _____ | _____ |
| 15. Storm sewer inlets: discharging into a structure with a sump that is less than 75' away. | _____ | _____ |
| 16. Storm sewer 18" and larger outlet to open drains w/ bar screen/animal grate | _____ | _____ |
| 18. Restricted cover on the storm MH along with 4-inch restrictor | _____ | _____ |
| 19. Roof downspouts are not permitted to discharge directly into combined storm Sewer system and must be directed onto greenspace. | _____ | _____ |

20. Oakland County standard detail sheet attached to plans.	_____	_____
21. Special backfill shown and labeled on plan view where storm sewer is under the influence of pavement.	_____	_____
22. Detention Basin (2" over entire site)	<u>Yes</u>	<u>No</u>
a. The basin must discharge in 48 hours	_____	_____
b. The basin shall be completely fenced	_____	_____
c. 1 on 6 side slope max,(1 on 5 side slope max) min. 4' distance from the fence	_____	_____
d. 4' high vinyl-clad, chain link fence w double opening 12' wide gate	_____	_____
e. Provide a cross section of the basin	_____	_____
f. Bottom of basin shall have a min. 1% gutter line. The slope of the gutter line to the outlet shall be a minimum of 0.5%	_____	_____
g. Provide 15/12 feet wide maintenance area around basin.	_____	_____
g. The entire basin must be seeded or sodded	_____	_____
h. Provide concrete rip-rap at all pipe entrances to the basin	_____	_____
i. MDOT type end sections for open endings (Subdivisions)	_____	_____
j. Stormwater Agreement must be provided (in Engineering Checklist)	_____	_____
k. Positive slope on basin invert (across basin floor)	_____	_____
l. 12" free board provided.	_____	_____
m. Outlet shown/provide animal grate	_____	_____
n. Calculations for the proposed storage system show the provided retention volume	_____	_____
o. Provided retention volume meets or exceeds required volume according to Oakland County Water Resources Commissioner Stormwater Engineering Design Standards	_____	_____
p. Dimensions (LxW of storage area, pipe diameter, etc.) shown for entire system	_____	_____
q. Outlet Control Structure provided which limits flow from retention system into Combined sewer to allowed flow from Oakland County Standards	_____	_____
r. Details for proposed storage system and outlet control structures	_____	_____
s. Adequate cover above storage system provided	_____	_____
t. Backfill materials and thicknesses match manufacturer and geotechnical report recommendations	_____	_____
u. Does the design meet requirements based on Oakland County Retention/Detention Basin Formulas?	_____	_____
v. Provide drainage certification on plans	_____	_____
w. Is Detention Basin overflow channel provided?	_____	_____
x. Ensure downstream conditions do not warrant further restriction or limiting of Discharge from detention basin.	_____	_____
	_____	_____

V. Paving and Grading

Yes No

- | | | |
|--|-------|-------|
| 1. Topo plan w/2' contours or 50' spot elevations. (5' contours allowed if slopes >10%) | _____ | _____ |
| 2. Scale no smaller than 1"=50' | _____ | _____ |
| 3. Offsite elevations (100' beyond property site in each direction). | _____ | _____ |
| 4. Pavement cross sections shown: | | |
| a. Parking areas. | _____ | _____ |
| b. Drive lanes (deep strength required). | _____ | _____ |
| c. Public and private roads. | _____ | _____ |
| 4. Concrete pavement cross-sections: | | |
| a. 6" for parking areas | _____ | _____ |
| b. 7" for residential streets (6" for driveways) | _____ | _____ |
| c. 9" for industrial streets | _____ | _____ |
| 5. Curb detail shown 18" wide. (Straight faced and asphalt curbs not allowed). | _____ | _____ |
| 6. Curb cut length (greater than or equal to 10' and less than or equal to 25') | _____ | _____ |
| 7. Curb cut spacing (greater than or equal to 25', commercial only) | _____ | _____ |
| 8. Integral sidewalk and curb detail shown if applicable. (18" footing). | _____ | _____ |
| 9. Show top-of-curb elevations at 50' intervals. | _____ | _____ |
| 10. Proposed elevations in boxes. | _____ | _____ |
| 11. Pavement grades: | | |
| a. Concrete: Minimum 0.5%, Maximum 6% (min 1% cross) | _____ | _____ |
| b. Asphalt: Minimum 1%, Maximum 6% (min 2% cross) | _____ | _____ |
| c. Concrete Curb and Gutter: 0.5% Minimum Longitudinally | _____ | _____ |
| 12. Provide minimum of 0.30' drop around curb returns. | _____ | _____ |
| 13. Roads: | | |
| a. Cul-de-sacs: maximum length 600'. | _____ | _____ |
| b. Show centerline stationing and curve data. | _____ | _____ |
| c. Show stationing left to right. | _____ | _____ |
| d. Provide intersection and cul-de-sac details
(elevations, dimensions and drainage scheme). | _____ | _____ |
| 14. Road Profile: | | |
| a. Proposed centerline grade and existing ground at centerline | _____ | _____ |
| b. Provide vertical curve, if grade change exceeds 1% | _____ | _____ |
| c. All utility crossings | _____ | _____ |
| 15. Sidewalks (5' wide): | | |
| a. Along existing public R.O.W.'s. | _____ | _____ |
| b. Along both sides of all proposed R.O.W.'s
(except along industrial roads or within subdivisions). | _____ | _____ |
| c. Within a site, as necessary. | _____ | _____ |
| d. Cross-section shown: 4" min, 6" for drive crossings. | _____ | _____ |
| 16. On site (excluding R.O.W.) pavement quantities (i.e. LF curb, pavement area, sidewalk area, etc.) shown on plan. | _____ | _____ |
| 17. Building with foundation drains discharging into an enclosed pipe. | _____ | _____ |
| 18. Roof runoff piped at 5' away from building. | _____ | _____ |
| 19. Runoff contained on-site. | _____ | _____ |
| 20. Off-Site runoff addressed. | _____ | _____ |
| 21. Provide a Soil Erosion Plan specific to the site. | _____ | _____ |
| 22. Provide Oakland County Standard Detail Sheet for Soil Erosion. | _____ | _____ |

Permits/Items Required

- Soil Erosion and Sedimentation Control Detail Sheet and copy of Water Resources Commissioner (WRC) Permit
- Copy of WRC Drain Tap Permit
- Copy of Road Commission for Oakland County (RCOC) Permit, if required
- Copy of Road Commission for Michigan Department of Environment, Great Lakes and Energy (EGLE) Permit
- Stormwater maintenance agreement (draft document only)
- Southeastern Oakland County Water Authority (SOCWA) Permit or Exemption Letter
- Copy of Michigan Department of Transportation (MDOT) Permit
- City Permits (building, utility, right-of-way, site (private), lot split/comination) along with Bond (right-of-way restoration Bond, etc.) Provide all approvals.
- New easement document(s)/exhibit(s)
- Traffic Control/Maintenance Plan
- Construction Schedule
- List of contractors/subcontractors
- Bonds (Performance, Labor & Material, and Maintenance & Guarantee) and insurance policies, including the Owners Contractors Protective (OCP). Each bond must be issued for the total estimated construction cost for ALL work done within the public right-of-way.

“AS-BUILT” REQUIREMENT CHECKLIST (COMMERCIAL DEVELOPMENTS) Upon satisfactory completion and execution of the work as proposed in the approved Final and Engineering Site Plans, the Applicant/Developer must provide a set of “as-built” drawings for review by the City, their appropriate department(s), and/or Professional Consultants prior to final acceptance of the project. "As-built" drawings shall contain all the information shown on the approved construction drawings with the addition of but not limited to the following information.	NA	INCLUDED	
		YES	NO
1. Sanitary sewers and storm sewers A. Plan location of all sewers with respect to Property and right-of-way lines. B. A minimum of three (3) witnesses (dimensions) to all force main bends. C. Length of sewer as measured from center of manhole to center of manhole (this information should be shown on both plan and profile). D. Location of each service lead as measured from the nearest downstream manhole and noted as such. E. Length of stubs out of manholes. F. The following "as-built" elevations on a U.S.G.S datum: A. Manhole, inlet, and catch basin covers; B. Invert elevations of pipes within each manhole; C. Invert elevations for the ends of sanitary and sump service leads. Changes in percents between manholes. G. List of material used for construction. (Example) Manholes: Precast, concrete specialties, press wedge flex-joint, Pipe: Eight-inch V.C.P. Clow, No Bell six-inch V.C.P. Logan, 0-ring H. Any changes in pipe and manhole locations of more than five (5) feet shall be redrawn on the plan and profile. The original plan locations of these facilities should be x-ed out on the plans. I. Any changes to the total quantities shall be lined out and the correct "as-built" quantity indicated. J. The following "as-built" information for all sanitary service leads: 1. Station of wye; 2. Length of lead; 3. Length of riser; 4. Tie from nearest manhole to end of lead,			

"AS-BUILT" REQUIREMENT CHECKLIST (COMMERCIAL DEVELOPMENTS)	NA	INCLUDED	
		YES	NO
<p>2. Retention and detention ponds</p> <ul style="list-style-type: none"> a. "As-built" of pond; b. The following "as-built" elevations on a U.S.G.S datum: <ul style="list-style-type: none"> C. Overflow spillway; D. Inlet and outlet pipe inverts; E. Outlet structure cover; F. Outlet and inlet ditch elevations G. Bottom and top of bank slopes. • A statement of final computed volume of the pond as measured from high water elevation to the invert of the outlet pipe. 			
<p>3. Roadways</p> <ul style="list-style-type: none"> A. Top of curb elevations (U.S.G.S. datum) at high and low points, edge of pavement elevations shall be provided in the case of open ditch road designs. B. "As-built" profiles for any changes in road design. C. Parking lot corner elevations 			
<p>4. Water mains</p> <ul style="list-style-type: none"> 1. Plan location of all water mains with respect to property lines. 2. Rim (cover) elevations on gate wells (U.S.G.S. datum). 3. Fire hydrant bury line elevations (U.S.G.S. datum) 4. Distances between gate wells, fittings, and fire hydrants. 5. Type of materials used in construction. 6. Any changes in pipe and structure locations exceeding five (5) feet shall be redrawn on the plan. The original plan locations of these facilities shall be "x-ed" out on the plan. 7. Any changes to the total quantities shall be lined out and the correct "as-built" quantity indicated. 			
<p>5. Floodways</p> <ul style="list-style-type: none"> 1. "As-built" ground elevations of all areas located within a floodway. 			

“AS-BUILT” REQUIREMENT CHECKLIST (COMMERCIAL DEVELOPMENTS)	NA	INCLUDED	
		YES	NO
SANITARY SEWER			
A. PLAN VIEW			
1. Lengths Between Manholes			
2. Size of Pipe			
3. Lengths of Casing Pipe			
4. Ties to Manholes in Greenbelt Areas			
5. Ties to Pipe			
6. Permit Number (County and MDPH)			
7. T/Casting Grades			
8. Manhole Numbering			
9. Y Locations (per as-built key)			
10. Show all Utility Easements for Sanitary Sewer			
B. PROFILE			
1. Lengths Between Manholes			
2. Size of Pipe			
3. Lengths of Casing Pipes			
4. Y Locations (per as-built key)			
5. Invert Grades			
6. Manhole Numbering			
7. Percent Slope Between Manholes			
STORM SEWER			
A. PLAN VIEW			
1. Lengths Between Manhole – Catch Basins – Inlets			
2. Size of Pipe			
3. Ties to Manholes – Catch Basins – Inlets to Greenbelt Areas			
4. Ties to Pipe			
5. Type and Class of Pipe			
6. T/Casting Grades			

“AS-BUILT” REQUIREMENT CHECKLIST (COMMERCIAL DEVELOPMENTS)	NA	INCLUDED	
		YES	NO
7. Structure Numbering			
8. Special Structures (low head, 5’ dia., 6’ dia., 2’ sump, etc.)			
9. Show all Utility Easements for Storm Sewer			
B. PROFILE			
1. Length Between Structures			
2. Size of Pipe			
3. Type and Class of Pipe			
4. T/Casting Grades			
5. Invert Grades			
6. Structure Numbering			
7. Percent Slope Between Structures			
8. Type of Joint Used			
DETENTION POND/UNDERGROUND DETENTION SYSTEM (SEE STORM SEWER)			
A. PLAN VIEW			
B. PROFILE			
WATER MAIN			
A. PLAN VIEW			
1. Lengths Between Gate Valve and Well			
2. Size of Pipe			
3. Ties to Gate Valve and Well in Greenbelts			
4. Ties to Hydrants			
5. Ties to Stop Boxes, etc.			
6. Type and Class of Pipe w/or without Polywrap			
7. Finish Grade of Hydrants			
8. T/Casting Grades			
9. Horizontal Bend Locations			
10. Location of Thrust Blocks or Type of Restraint			

“AS-BUILT” REQUIREMENT CHECKLIST (COMMERCIAL DEVELOPMENTS)	NA	INCLUDED	
		YES	NO
11. Offsets to Pipe of Ties to Building			
12. Gate Valve and Well Numbers			
13. Permit Numbers (County and MDPH)			
14. Pipe Manufacturer			
15. Hydrant Manufacturer			
16. Casting Manufacturer			
17. Show all Utility Easements for Water Main			
B. PROFILE			
1. Lengths Between Grade Changes			
2. Size of Pipe			
3. Type and Class of Pipe			
4. Gate Valve and Well Location			
5. Hydrant Location (identify special purposes such as blow-off)			
6. Air Relief Valves / Blow Off Valve Locations			
7. Vertical Bend Locations			
8. T/Casting Grades			
9. Percent Slope Between Pipe			
PAVEMENT			
A. Width and Station of Pavement (measured from centerline)			
1. At end of radius at intersections			
2. At beginning of taper			
3. At end of taper			
4. Any changes in alignment			
5. Radius at intersection			
6. Right-of-way survey data			
B. Drives			
1. Location			

“AS-BUILT” REQUIREMENT CHECKLIST (COMMERCIAL DEVELOPMENTS)	NA	INCLUDED	
		YES	NO
2. Width			
3. Radius, if any			
C. Sidewalk			
1. Location			
2. Width			
3. Changes in alignment			
4. Ramps			

Appendix C

SAMPLE BONDS AND INSURANCE REQUIREMENTS

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PROJECT NAME

PERFORMANCE BOND

00610 / 1

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 "Owner" _____

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 It 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.

CONSULTING ENGINEER
PROJECT NUMBER

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PROJECT NAME

PERFORMANCE BOND
00610 / 2

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 changes or changes shall not modify, discharge or release this bond.

(A Michigan Corporation)

_____(Seal)

_____(Seal)

Principal

_____(Seal)

_____(Seal)

Surety

Signed, Sealed and Delivered
in the Presence of:

CONSULTING ENGINEER
PROJECT NUMBER

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PROJECT NAME

LABOR AND MATERIAL BOND

00620 / 1

LABOR AND MATERIAL BOND

KNOW ALL MEN BY THESE PRESENTS, That we _____

of _____ hereinafter called the Principal,

and _____

hereinafter called the Surety, are held and firmly bound unto _____

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 _____

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.

CONSULTING ENGINEER
PROJECT NUMBER

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PROJECT NAME

LABOR AND MATERIAL BOND
00620 / 2

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 terms 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 alteration, extension, or forbearance being hereby waived.

(A Michigan Corporation) _____

By: _____

Principal

Surety

Signed, Sealed and Delivered
in the Presence of:

CONSULTING ENGINEER
PROJECT NUMBER

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PROJECT NAME

MAINTENANCE AND GUARANTEE BOND

00630 / 1

MAINTENANCE AND GUARANTEE BOND

KNOW ALL MEN BY THESE PRESENTS, That we

as Principal, and _____

are held and firmly bound unto _____

in the sum of _____ Dollars (\$ _____)

good and lawful money of the United States of America, to be paid to the _____
its legal representatives and assigns, and 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 with the _____

dated this ___ day of _____ A.D., 20__, where in the said principal covenanted and agreed as follows, to wit:

for the: _____

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that by and under such contract,
the above named principal has agreed with the _____ that for a period of _____ (____)
year(s) from the date of approval of the Final Estimate, to keep in good order and repair any defect in all the
work done under said contract, either by the principal, 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, all to be made good without expense to the Owner,
(excepting only such part or parts of said work as may have been disturbed without the consent or approval of
the principal after the final acceptance of the work), and whenever directed so to do by the Owner, by notice
served in writing, either personally or by mail, on the principal at _____

or _____, its legal representatives, or successors, or on
the surety at _____

CONSULTING ENGINEER
PROJECT NUMBER

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PROJECT NAME

MAINTENANCE AND GUARANTEE BOND

00630 / 2

to proceed at once to make such repairs as directed by the Owner and in case of failure to do so within one (1) week from the date of service of such notice, or within reasonable time not less than one (1) week, as shall be fixed in said notice, then the Owner 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 be fully reimbursed for same from said principal or surety. If any repair is necessary to be made at once to protect life and property, the Owner may take immediate steps to repair or barricade such defects without notice to the contractor. In such case the Owner 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 Owner is final and conclusive.

If the principal for a period of one (1) year from the date of approval of a Final Estimate, shall keep the work so constructed under the contract in good order and repair, excepting only such parts of said work which have been disturbed without the consent or approval of the principal after the final acceptance of same, and whenever notice is given as hereinbefore specified, at once proceed to make the repair as the notice directs, or reimburse the Owner for any expenses incurred by it in making such repairs should the principal or surety fail to do so, then the above obligation shall be void; otherwise, it will remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed by their respective authorized officers this _____ day of _____, 20__.

Signed, Sealed and Delivered in the Presence of:	_____	“Principal”	_____
_____	_____		(L.S.)
Witness	_____	_____	(L.S.)
_____	_____	“Surety”	_____
Witness	_____	_____	(L.S.)
_____	_____		(L.S.)
Witness	_____	_____	(L.S.)

CONSULTING ENGINEER
PROJECT NUMBER

Client#: 7782 PAVCOR

ACORD **CERTIFICATE OF LIABILITY INSURANCE** DATE (MM/DD/YYYY)
04/02/2015

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Insurance Agency 24724 Any Street (248) 666-6666 P.O. Box 2067 SomeCity, MI 48037-2067	CONTACT NAME: Insurance Agent name PHONE (A/C, No, Ext): 248 555-5555 FAX (A/C, No): 248 111-1111 E-MAIL: InsuranceAgent@InsuranceGroup.com ADDRESS: _____ PRODUCER CUSTOMER ID #: _____
INSURED Company ABC 2654 Street Name AnyCity, MI 48183	INSURER(S) AFFORDING COVERAGE INSURER A : Insurance Company 1 INSURER B : Insurance Company 2 INSURER C : _____ INSURER D : _____ INSURER E : _____ INSURER F : _____

COVERAGES		CERTIFICATE NUMBER:				REVISION NUMBER:	
THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.							
INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> X,C,U <input checked="" type="checkbox"/> Contractual GEN'L AGGREGATE LIMIT APPLIES PER: POLICY <input checked="" type="checkbox"/> PROJECT <input type="checkbox"/> LOC	X	X	MPA00000042433S	11/17/2014	11/17/2015	EACH OCCURRENCE \$1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$100,000 MED EXP (Any one person) \$5,000 PERSONAL & ADV INJURY \$1,000,000 GENERAL AGGREGATE \$2,000,000 PRODUCTS - COMP/OP AGG \$2,000,000 \$
A	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS <input checked="" type="checkbox"/> NON-OWNED AUTOS <input checked="" type="checkbox"/> Drive Other Car	X	X	BA00000042434S	11/17/2014	11/17/2015	COMBINED SINGLE LIMIT (Ea accident) \$1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$ \$
A	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DEDUCTIBLE \$ RETENTION \$	X	X	CMB00000042435S	11/17/2014	11/17/2015	EACH OCCURRENCE \$2,000,000 AGGREGATE \$2,000,000 \$ \$
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory In NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N N	N/A	WC0001100655	05/01/2014	04/30/2015	<input checked="" type="checkbox"/> WC STATUTORY LIMITS <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$500,000 E.L. DISEASE - EA EMPLOYEE \$500,000 E.L. DISEASE - POLICY LIMIT \$500,000
A	Installation Floater	X		MPA00000042433S	11/17/2014	11/17/2015	\$150,000 \$1,000 deductible
DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)							
Municipality Name, their council, members, board members, public officials, consultants, agents, and (Please refer to attached Endorsements evidencing the change of policy.)							

CERTIFICATE HOLDER Municipality Name 18500 Street Name AnyCity, MI 48025	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE <div style="text-align: right;">SIGNATURE</div>
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DESCRIPTIONS (Continued from Page 1)

employees, as well as the engineer; _____ their owners, directors, officers, consultants, agents, and employees are included as Additional Insured per written contract with respect to the general, auto and umbrella liability coverages for the work performed by the named insured for the certificate holder. Insurance is considered primary and non contributing and a waiver of subrogation applies. Should any of the above described policies be cancelled before the expiration date thereof, the issuing Company will mail 30 days prior written notice to the Certificate holder. Endorsements evidencing the change of Policy are attached.

Example only

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SPREXC

ACORD™ INSURANCE BINDER		DATE 06/18/14	
THIS BINDER IS A TEMPORARY INSURANCE CONTRACT, SUBJECT TO THE CONDITIONS SHOWN ON THE REVERSE SIDE OF THIS FORM.			
PRODUCER	PHONE (A/C, No, Ext): 248-555-5555 FAX (A/C, No): 248-333-3333	COMPANY Selective Insurance Company of Amer	BINDER # BINDER83730
Insurance Company Name Any Street City, State Zip		DATE EFFECTIVE TIME 06/18/14 12:01 X AM PM	EXPIRATION DATE TIME 08/18/14 X 12:01 AM NOON
CODE: 38-3112729	SUB CODE:	THIS BINDER IS ISSUED TO EXTEND COVERAGE IN THE ABOVE NAMED COMPANY PER EXPIRING POLICY #:	
AGENCY CUSTOMER ID: 7430	DESCRIPTION OF OPERATIONS/VEHICLES/PROPERTY (Including Location) Project Description		
INSURED Owner's Name Any Street SomeCity, MI 48001			

COVERAGES		LIMITS		
TYPE OF INSURANCE	COVERAGE FORMS	DEDUCTIBLE	COINS %	AMOUNT
PROPERTY CAUSES OF LOSS <input type="checkbox"/> BASIC <input type="checkbox"/> BROAD <input type="checkbox"/> SPEC				
GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> OCP	Owners & Contractors Protective Liability RETRO DATE FOR CLAIMS MADE:			EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ 1,000,000 PRODUCTS - COMP/OP AGG \$
AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS				COMBINED SINGLE LIMIT \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE \$ MEDICAL PAYMENTS \$ PERSONAL INJURY PROT \$ UNINSURED MOTORIST \$
AUTO PHYSICAL DAMAGE DEDUCTIBLE <input type="checkbox"/> COLLISION: _____ <input type="checkbox"/> OTHER THAN COL: _____	<input type="checkbox"/> ALL VEHICLES <input type="checkbox"/> SCHEDULED VEHICLES			ACTUAL CASH VALUE \$ STATED AMOUNT \$ OTHER \$
GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT \$ OTHER THAN AUTO ONLY: EACH ACCIDENT \$ AGGREGATE \$
EXCESS LIABILITY <input type="checkbox"/> UMBRELLA FORM <input type="checkbox"/> OTHER THAN UMBRELLA FORM	RETRO DATE FOR CLAIMS MADE:			EACH OCCURRENCE \$ AGGREGATE \$ SELF-INSURED RETENTION \$
WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY				WC STATUTORY LIMITS E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
SPECIAL CONDITIONS/OTHER COVERAGES Named Insured to include: Owners Name & the Engineer, their (See attached Spec Conditions/Other Covs page.)				FEES \$ TAXES \$ ESTIMATED TOTAL PREMIUM \$

NAME & ADDRESS		MORTGAGEE	ADDITIONAL INSURED
Contractors Name SomeStreet AnyCity State Zip		LOSS PAYEE	<input checked="" type="checkbox"/> Contractor
		LOAN #	
		AUTHORIZED REPRESENTATIVE	<i>Michael G. Lewos</i>

SPECIAL CONDITIONS/OTHER COVERAGES (Cont. from page 1)

consultants, agents, employees,
& such public corporations in whose jurisdiction the work is located.

** Continued From Additional Interests Section **

CONSULTING ENGINEER
ADDRESS

Type: Additional Insured

Example only

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Appendix D

STANDARD EASEMENT AND STORM DRAIN AGREEMENT



EASEMENT

KNOW ALL MEN BY THESE PRESENTS, that _____,
_____, whose address is _____,
(hereinafter referred to as "Grantor"), being title holder to the following described parcel of land,
to-wit:

[See attached and incorporated Exhibit A]

Tax Identification Number: _____

for and in consideration of Ten Dollars, receipt and sufficiency of which is hereby acknowledged, does hereby grant and convey to the City of Berkley, a Michigan municipal corporation, whose address is 3338 Coolidge Hwy., Berkley, MI 48072, (hereinafter referred to as "Grantee"), a nonexclusive perpetual easement for _____, over, upon, across, in, through, and under the following described real property, to-wit:

[See attached and incorporated Exhibit B]

and to enter upon sufficient land adjacent to said _____ easement for the purpose of exercising the rights and privileges granted herein.

Grantee may install, repair, replace, improve, modify and maintain the _____, and all necessary appurtenances thereto, within the easement herein granted.

Grantor agrees not to build or to convey to others permission to build any buildings or structures on, over, across, in, through, or under the above-described easement that may interfere with or, in the opinion of Grantee, threaten to interfere with the use, operation, maintenance, repair and replacement of the _____ in the easement areas shown on the attached and incorporated Exhibit B.

Grantee agrees to reasonably restore the premises so disturbed by reason of the exercise of any of the rights and privileges granted herein.

This instrument shall run with the land first described above and shall be binding upon and inure to the benefit of the Grantor, Grantee, and their respective heirs, representatives, successors and assigns.

IN WITNESS WHEREOF, the undersigned Grantor has affixed their signature this _____ day of _____, 2017.

GRANTOR:

By:
Its:

STATE OF MICHIGAN)
) SS
COUNTY OF OAKLAND)

On this _____ day of _____, 20__, before me, personally appeared the above named _____, to me known to be the person described in and who executed the foregoing instrument and acknowledged that they executed the same as his free act and deed.

Notary Public
_____ County, MI
Acting in _____ County
My commission expires _____

THIS INSTRUMENT DRAFTED BY:

AND WHEN RECORDED RETURN TO:

STORM WATER DRAINAGE SYSTEM AGREEMENT

THIS AGREEMENT is made this _____ day of _____, 20____, by and between the City of Berkley (the “City”), with principal offices located at 3338 Coolidge Hwy, Berkley, MI 48072 (the “City”) and _____, a Michigan **[profit corporation/limited liability company]**, with principal offices located at _____, (“Developer”).

RECITATIONS:

A. Developer is developing certain property located in the City of Berkley, Oakland County, Michigan as **[nature of development]** (“Development”) as more particularly described in Exhibit A attached hereto. **[Exhibit A should include the legal description of the development and the engineering drawings of the storm drain system.]**

B. As part of the Development, Developer is required to construct a storm drainage system (“System”) to provide adequate drainage and treatment of storm water for the Development. The storm water drainage system is depicted on the map attached hereto as Exhibit A.

C. The City has issued a permit (“Permit”) to Developer authorizing the construction, operation and maintenance of the storm drainage system, which is located within the Oakland County Water Resources Commissioner and/or the Michigan State Highway Department's right-of-way and/or drain, on or adjacent to the Development. **[This Paragraph may be deleted if system is entirely on-site]**

D. As used herein, “Developer” includes all of Developer’s successors and assigns, including all current and future owners and occupiers of property within the Development.

NOW, THEREFORE, for and in consideration of the mutual covenants and benefits to be derived hereunder, the receipt, adequacy and sufficiency of which is hereby acknowledged, the City and the Developer agree as follows:

1. All of the foregoing Recitals are true and correct and are incorporated herein as part of the Agreement for all purposes.
2. Developer shall prepare and submit to the City for review and approval by the City, in its sole discretion, all construction and as-built plans and specifications for the storm water drainage system as the City may require.
3. Developer shall construct the storm water drainage system as part of the Development in accordance with the plans and specifications approved the City of Berkley.
4. Developer agrees that it will maintain in good working condition, and to perpetually preserve and repair at its own expense, the storm water drainage system described in Exhibit A.
5. The City shall have the right, but not the duty, to enter the property comprising the Development for the purpose of inspecting the storm water drainage system for compliance to the Permit, and to ensure the system stays in good working order.
6. If Developer fails to preserve and/or maintain the storm water drainage system in reasonable order and condition, the City may serve written notice upon Developer setting forth the deficiencies in maintenance and/or preservation along with a demand that the deficiencies be cured within a stated reasonable period, and time, date, and place for a hearing before the City Council for the purpose of allowing them an opportunity to be heard as to why the City should not proceed with the correction of the deficiency or obligation, which has not been undertaken or properly fulfilled. At any such time for hearing, the time for curing and the hearing itself may be extended and/or continued to a specific date. If, following such hearing, the City Council shall determine that the obligation has not been fulfilled or failure correction within the time specified in the notice, as determined by the City in its sole and reasonable discretion, the City thereupon shall have the power and authority, but not the obligation, to enter upon the property or cause its agents or contractors to enter the Development and perform such obligation or take such corrective measures as reasonably found by the City to be appropriate or necessary with respect to the storm water drainage system. The cost of making and financing such improvements by the City, including notices by the City and reasonable legal fees incurred by the City, plus an administrative fee of 25% of the total of all such costs and expenses incurred, shall be paid by Developer within thirty (30) days of billing to it. All unpaid amount may be placed on the delinquent tax roll of the City as to the property within the Development, and shall accrue interest and penalties, and shall be collected as, and shall be deemed delinquent real property taxes, according to the laws made and provided for the collection of delinquent real property taxes. In the discretion of the City, such costs and expenses may be collected by suit initiated against Developer, and in such event, Developer shall pay all court costs and reasonable attorney fees incurred by the City in connection with such suit.

7. In the event that City, in its sole discretion, determines that the condition of the storm water drainage system has deteriorated to the point that, or the deficiency in the operation and/or maintenance by Developer is such that there is a danger to the public health, safety and welfare or there is a substantial potential for damage to any property and/or road improvements, the City's obligation to provide written notice to Developer shall be deemed waived, and the City or its authorized agent may enter the Development to immediately begin emergency maintenance and/or repair work. If it is found necessary to adjust or relocate all or any portion of the storm water drainage system within the road right-of-way, the City shall, upon advance notice to Developer, cause such adjustment or relocation to occur. Prior to any work being performed in the road right-of-way, a permit shall be secured from the City, -Road Commission for Oakland County, or Michigan Department of Transportation, as applicable. The cost for all such work shall be billed to Developer under the same procedure set forth in paragraph 6 above.

8. Notwithstanding Developer's assumption of the responsibilities and the acceptance of liabilities stated herein, the City shall retain jurisdiction over the storm drainage system and its rights and remedies under the Municipal Separate Storm Sewer System (MS4) Permit or any applicable statute, ordinance, rule or regulation are hereby preserved. Without limitation of the foregoing, Developer, at its sole cost and expense, shall perform maintenance of the storm water facilities described in the City's Storm Water Management and Long-Term Maintenance Plan as Exhibit B attached hereto and incorporated herein by reference.

9. Developer shall defend, indemnify and hold the City harmless from and against any claims, demands, actions, damages, injuries, costs or expenses of any nature whatsoever ("Claims"), fixed or contingent, known or unknown, arising out of or in any way connected with the design, construction, use, maintenance, repair or operation (or omissions in such regard) of the storm drainage system referred to Exhibit A hereto, appurtenances, connections and attachments thereto which are the subject of this Agreement. This indemnity and hold harmless shall include any costs, expenses and attorney fees incurred by the City in connection with such Claims or the enforcement of this Agreement.

10. Developer shall comply with the Elliott-Larsen Civil Rights Act, Public Act 453 of 1976, MCL 37.2101 *et seq.*

11. The City shall record this Agreement with the Oakland County Register of Deeds at Developer's expense.

12. The parties hereto make this Agreement on behalf of themselves, their heirs, successors, assigns and transferees; and hereby warrant that they have the authority and capacity to execute this Agreement and bind the property as described in this Agreement. This Agreement shall run with the land and be binding upon all owners, their agents, heirs, successors, assigns, and transferees.

13. This Agreement shall be interpreted in accordance with the laws of the State of Michigan.

14. Invalidation of any of the provisions of this Agreement by Judgment or Court order shall in no way effect the validity of any other provision(s), which shall remain in full force and effect.

15. The City's failure to exercise a right or remedy will not operate as a waiver of any of the City's rights or remedies under this Agreement.

16. This Agreement may only be amended, modified, or supplemented by an agreement in writing approved by the respective Councils and signed by an authorized representative of each party.

17. This Agreement is for the sole benefit of the parties and their respective successors and permitted assigns, and nothing in this Agreement, express or implied, is intended to or shall confer on any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of this Agreement.

18. All matters arising out of or relating to this Agreement, are governed by, and construed in accordance with, the laws of the state of Michigan. Each party agrees that it will not bring any action, litigation, or proceeding against any other party in any way arising from or relating to this Agreement in any forum other than the courts of the state of Michigan sitting in Oakland and any applicable Michigan appellate court. Each party submits to the exclusive jurisdiction of those courts and agrees to bring any such action, litigation, or proceeding only in those courts.

19. This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall be deemed to be one and the same agreement. A signed copy of this Agreement delivered by facsimile, e-mail, or other means of electronic transmission shall be deemed to have the same legal effect as delivery of an original signed copy of this Agreement.

20. No provision of this agreement shall be construed against or interpreted to the disadvantage of one party against the other party by any court, or governmental authority, by reason of any determination or assertion that one party was chiefly or primarily responsible for having drafted, dictated or structured such provision.

21. Developer warrants that is a **[corporation / limited liability company]**, organized, validly existing, and in good standing under the laws of the state of Michigan.

22. Developer warrants that is qualified to do business and is in good standing in every jurisdiction in which that qualification is required for purposes of this Agreement, and that it has obtained and maintained in good standing any licenses required under Michigan law.

23. Developer warrants that it has the full right, power, and authority to enter into this Agreement and to perform its obligations under it.

24, Nothing herein shall be construed as a waiver of governmental immunity by the City.

[The remainder of this page is intentionally blank, signature pages to follow.]

IN WITNESS WHEREOF, Developer and City have executed this Agreement on the day and year first above written.

[Name of Developer]

[Printed name]

Its: [Managing Member / President]

STATE OF MICHIGAN)
) SS
COUNTY OF OAKLAND)

Acknowledged by _____ before me on the ____ day of
[Name of Managing Member/President & Title]
_____, 20__.

[Signature of Notary]

[Printed name of Notary]

Notary Public, _____
County, Michigan

My commission expires: _____

City of Berkley

City Manager

STATE OF MICHIGAN)
) SS
COUNTY OF OAKLAND)

Acknowledged by _____ before me on the ____ day of
[Name of City Manager & Title]
_____, 20__.

[Signature of Notary]

[Printed name of Notary]

Notary Public, _____
County, Michigan

My commission expires: _____

INSTRUMENT DRAFTED BY:

WHEN RECORDED RETURN TO:

City Clerk
City of Berkley
3338 Coolidge Hwy.
Berkley, MI 48072

EXHIBIT A

Provide legal description of the development and engineering drawings of storm drainage system.

EXHIBIT B

Attach Developer's long-term maintenance plan for the proposed storm drainage system (Developer's engineer will create this based on standards set by the City's engineering consultant).