

Charter Township of Ypsilanti Engineering Standards and Design Specifications



Veterans Memorial Drive
Ypsilanti Township, Michigan



Charter Township of Ypsilanti
7200 S. Huron River Drive
Ypsilanti, MI 48197



Ypsilanti Community Utilities Authority
2777 State Road
Ypsilanti, MI 48198



Adoption Date: June 2020

Revision Date: June 2020

PREFACE

The following includes technical engineering standards for both the Charter Township of Ypsilanti and the Ypsilanti Community Utilities Authority (YCUA). The purpose of this document is to provide uniform engineering standards for capital improvements, future development and redevelopment alike as it relates to the design, materials, and methods of construction. This document should be reviewed as well as other local agency standards and local ordinances. For purposes of new development or redevelopment, the office of community standards should be contacted to discuss process and procedures. They can be contacted at (734) 485-4393.

These Engineering Standards and Design Specifications were adopted on **June 16, 2020** and may be amended from time to time.

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I. INTRODUCTION TO THE STANDARDS AND DESIGN SPECIFICATIONS

A. Understanding the Standards and Engineering Process

The existence and constant improvement of the growing network of public utility, drainage and road system infrastructure within the Charter Township of Ypsilanti (Ypsilanti Township) demands the need to maintain an updated compilation of engineering based standards and design specifications for development and infrastructure improvements.

These standards and design specifications (standards) are intended to guide public capital improvement infrastructure projects that occur within the Township and that are under the jurisdiction of Ypsilanti Township, and the Ypsilanti Community Utilities Authority (YCUA). These standards are also intended to serve those who wish to develop or redevelop a property within Ypsilanti Township and ensure that a high level of quality during the planning, design and construction phase occurs. These specifications have been developed to focus on all engineering aspects associated with site development and infrastructure improvements and include sections specific to: topographic survey, water supply system, wastewater system, storm water management, paving improvements, sidewalk and pathway, grading and earthwork and soil erosion and sedimentation control.

These standards were created to ensure infrastructure is installed at a high level of quality in the interest of promoting economic growth while facilitating maintenance and operations of the utilities.

These standards will help serve as a guide through the engineering and construction stages of a project by providing information so one can effectively and efficiently navigate through the process. Understanding the standards and Township ordinances prior to starting design and communicating with Township and agency staff throughout is strongly encouraged and will help achieve positive results with regards to the proposed improvement.

These standards supplement all other applicable requirements of the Township Ordinances as well as requirements of any other impacted agencies. In the event that any of the standards, ordinances or requirements presents a conflict, the ordinance shall govern. These standards are intended to provide the minimum guidelines for engineering infrastructure plans. Throughout planning, engineering design and construction of an infrastructure improvement, the Ypsilanti Township Office of Community Standards (OCS) can be contacted for information or answers to questions that may arise. The Township OCS can be reached at (734) 485-4393.

B. Capital Improvement and Public Infrastructure Design

For all public capital improvement and infrastructure design being conducted within Ypsilanti Township the Technical specification sections starting with Section III (Topographic Survey) through Section IX (Soil Erosion and Sedimentation Control) should be followed.

1. Permit Requirements

For all public capital improvement designs, permits and/or waivers may be necessary from Ypsilanti Township, YCUA and other applicable agencies. It is important to contact each agency prior to commencing design to obtain details on what requirements may be necessary to carry out the planning and construction and what potential existing infrastructure may impact the proposed improvement. A listing of facilities and controlling agency and contact information has been provided below. This includes local, regional, state and franchise entities. Please note that the list below is not all inclusive and additional agency may need to be contacted based on the uniqueness of the project area.

Local Facility	Controlling Agency	Permit or Waiver	Contact information
Water Supply System and Wastewater System	Ypsilanti Community Utilities Authority (YCUA)	Letters of Approval	Engineering Department 2777 State Road Ypsilanti, Michigan 48198 (734) 484-4600
Public Roadways	Washtenaw County Road Commission (WCRC)	Letters of Approval & Permits or Waiver Letter Claiming No Jurisdiction	555 N. Zeeb Road Ann Arbor, Michigan 48103 (734) 761-1500
Well / Septic Services	Washtenaw County Department of Planning and Environment	Permit or Waiver Letter	705 N. Zeeb Road PO Box 8645 Ann Arbor, MI 48107-8645 (734) 222-3930
Soil Erosion & Sedimentation Control	Charter Township of Ypsilanti	Permit or Waiver Letter	Office of Community Standards (OCS) 7200 S. Huron River Drive Ypsilanti, Michigan 48198 (734) 485-3943
Bus Stops	Ann Arbor Area Transportation Authority (AAATA)	Letter of Approval where bus stops proposed/affected	2700 S. Industrial Hwy. Ann Arbor, MI 48104 (734) 973-6500
County Water Resources	Washtenaw County Water Resources Commissioner's Office	Letter of Approval, Permit or Waiver Letter Claiming No Jurisdiction	P.O. Box 8645 705 N. Zeeb Road Ann Arbor, Michigan 48103 (734) 994-2525
Regional or State Facility	Controlling Agency	Permit or Waiver	Contact information
State Roadways: Interstate 94, Michigan Avenue, Washtenaw Avenue, and Ecorse Road	Michigan Department of Transportation	Letter of Approval and Permits	Brighton TSC 10321 Grand River Avenue Suite 500 Brighton, MI 48116 (810) 227-4681
Regional or State Facility	Controlling Agency	Permit or Waiver	Contact information

Water Supply System	Great Lakes Water Authority (GLWA)	Stamp of Approval or Waiver Via YCUA (Submittal must be via YCUA)	735 Randolph Street Suite 1900 Detroit, Michigan 48226 (313) 267-6000
	Michigan Department of Environment, Great Lakes, & Energy Public Wastewater and Drinking Water Unit Water Bureau	Act 399 Permit (Submittal must be through YCUA or GLWA)	Jackson District Office 301 E. Louis Glick Highway 4th Floor State Office Building Jackson, Michigan 49201 (517) 780-7690
Wastewater System	Michigan Department of Environment, Great Lakes, & Energy Public Wastewater and Drinking Water Unit Water Bureau Southeast Michigan District Office	Part 41 Permit (Submittal must be through YCUA)	27700 Donald Court Warren, MI 48092-2793 (586) 753-3700
Wetlands and Impacts to Waters of the State	Michigan Department of Environment, Great Lakes, & Energy and/or EPA	Permit	525 West Allegan St PO Box 30473 Lansing, MI 48909-7973
Franchise Facility	Controlling Agency	Permit or Waiver	Contact information
Gas	DTE Energy (MichCon)	Letter of Approval (Projects where gas lines are impacted)	Replacement Team Noble Second Floor 3200 Hobson Detroit, Michigan 48201 (313) 577-7350
Electric	DTE Energy	Letter of Approval (Projects where electric lines are impacted)	Case Manager 982 Broadway Ann Arbor, Michigan 48105 (734) 332-3313
Franchise Facility	Controlling Agency	Permit or Waiver	Contact information

Telephone	AT&T	Letter of Approval (Projects where phone/fiber optic lines are impacted)	550 S. Maple Road Ann Arbor, Michigan 48103 (734) 996-5300
Cable Television/Telephone	Comcast Cable Communications, Inc.	Letter of Approval (Projects where cable lines are impacted)	5855 Interface Drive Ann Arbor, Michigan 48103 (734) 369-3776
Private Facility	Controlling Agency	Permit or Waiver	Contact information
Wolverine Pipeline	Wolverine Pipeline	Letter of Approval for crossings	8075 Creekside Drive Portage, MI 49024 (269) 323-2491
BP Pipeline	BP Pipeline	Letter of Approval for crossings	30 South Wacker Drive Chicago, IL 60606 (630) 420-5111
ANR Pipeline	ANR Pipeline	Letter of Approval for crossings	27725 Stansbury Boulevard Farmington Hills, MI 48334 (313) 965-1616
Norfolk Southern Railroad	Norfolk Southern	Letter of Approval for crossings, ROW Occupation	DMJM Harris 260 S. Broad St., Ste. 1500 Philadelphia, PA 19102 Attn: NS Pipe and Wire Administrator

2. Standard Details

For all proposed public infrastructure improvement projects within Ypsilanti Township, the standard detail sheets shall be included in the plan set.

C. Private Development Process

The plan review process in Ypsilanti Township represents a phased approach aimed at first promoting discussion of design concepts, then a site plan review and ultimately a detailed engineering review. Detailed standards and check lists are included within this document to serve as a guide to plan development, engineering design, material selection and construction. These checklists do not necessarily include every requirement needed for approval as individual sites may have unique features that may have to be addressed in ways which are not necessarily outlined. A more comprehensive description of the review process is included in Section II– Plan Review Process. A brief summary of each phase of the plan review process is as follows:

1. Plan Review Process Overview

a. Pre-Application Meeting

Prior to developing plans, applicants and/or their representatives are required to schedule a pre-application meeting with the Township, their consultants and local agencies to discuss the following: design concepts, site compliance with ordinances and standards, and the proposed work is in general, feasible. At a minimum, a sketch plan or concept plan should be submitted by the applicant to the Office to distribute for review not less than two weeks before the meeting date. All applicable fees shall be paid by the applicant and the Township will schedule this meeting to be held at the Township Civic Center (located at 7200 S. Huron River Drive, Ypsilanti MI, 48197). The Township will forward invitations to all applicable local agencies. It is intended that the applicant will receive feedback from the reviewing agencies to facilitate and streamline the plan review process.

b. Site, Sketch or Plot Plan Review

The Township OCS will require that each development that is subject to site plan, sketch plan or plot plan review per the ordinance, create and submit a plan for review. The Township OCS will also determine if the review will need to be approved by the planning commission or be approved administratively. A final site plan may also be required based on the Township Ordinances. The applicant shall submit plans and fees to all applicable agencies. These submittals can be coordinated through the Township OCS Department. With submittals, review fees shall be paid to the Township OCS and in accordance with the adopted Township Fee Schedule to the Township OCS for tracking and distribution. It should be noted that other agencies, including YCUA, WCRC and the WCWRC may also have review fees that are not covered by those collected at the Township. The Township and / or their consultants and other agencies will then review the plans and prepare letters to be sent back to the Township OCS generally within three weeks of distribution. If OCS staff determines the plans to be in good order, then OCS staff will present the submitted plan to the Township Planning Commission for action. The Planning Commission may approve, approve with conditions, table, deny or make a recommendation to the Township Board. More detail regarding preliminary site, sketch and plot plan reviews can be found in Section II.

c. Detailed Engineering Plan Review

Prior to proceeding to construction or obtaining Township Board approval of the final site plan (where required), the applicant shall submit detailed engineering and soil erosion and sedimentation control plans for review. The detailed engineering plan phase represents an in-depth review of the design plans that includes verifying site grading, water supply, wastewater system, storm water designs and paving improvements. The applicant shall submit signed and sealed plans by a licensed State of Michigan Professional Engineer, a detailed engineering submittal form (included in Appendix B), an engineer's opinion of cost and the appropriate review fees to the OCS. The OCS staff will then distribute the plans to their consultants and other agencies to review. Review and approval by all applicable agencies is required prior to commencement of construction activity. More detail regarding the detailed engineering review can be found in Section II.

d. Permit Requirements from Other Agencies

As part of the design phase of the project, the applicant shall explore all requirements of any impacted public infrastructure. Further, as the site improvements are engineered and developed, the applicant shall be aware that proposed improvements may result in having to obtain approvals, permits or waivers from various agencies. Aside from the Township Planner, Engineer and YCUA reviews that are required, the applicant is encouraged to review the list (Section I.B.1.) of various utilities and government entities owning facilities that are typically impacted as part of work in the Township. The applicant is strongly encouraged to contact these agencies early in the design process to discuss potential impacts to the site.

2. Pre-Construction Phase

After receiving plan approvals or waivers from all affected agencies and all applicable Township approvals, the applicant shall compile and submit all relevant items requested by the Township, YCUA or the Township Engineer. Once these items have been properly completed the applicant will be able to proceed with construction activity.

a. Pre-Construction Requirements

Upon approval of detailed engineering plan, a letter outlining required fees, escrows, performance and maintenance guarantees, and insurance will be prepared and forwarded to the applicant. This letter provides a detailed calculation of the required escrow account deposit based on the amount of infrastructure proposed by the applicant and assumed production rate. The applicant acknowledges understanding of the document by submitting all applicable documents and attending the pre-construction meeting. If any of the items listed in this letter are not in place prior to the start of the pre-construction meeting the Township and/or YCUA holds the right to reschedule the pre-construction meeting to a later date when all items have been properly submitted to the satisfaction of the Township, the Township Engineer and YCUA.

b. Performance Guarantees

As part of the site development process, Ypsilanti Township requires that all projects post sureties to ensure the timely and complete construction of approved site infrastructure. The applicant shall furnish security and guarantee in accordance with Section 2307, Security for Completion of Improvements and Section 2308, Guarantee, of Appendix A – Zoning of the Charter Township of Ypsilanti Code of Ordinances.

- i. The Township will require a performance guarantee in an amount not less than 100% of the engineer's opinion of cost for the storm water management system, grading, paving, SESC, landscaping and other site related improvements (excluding the building) as defined in item I.C.1.c. prior to construction. An irrevocable standby letter of credit shall automatically renew on its own term for periods of no less than one year unless written notification to Township from the financial institution is received sixty days prior to its expiration date. This security shall remain on deposit with the Township until recommendation of final acceptance of the infrastructure improvements is

given by the Township Engineer. At the time of final acceptance, the performance guarantee will be returned to the applicant.

Partial releases of the storm water management system, grading, paving, SESC, and landscaping performance guarantee may be granted prior to acceptance upon request of the applicant, provided commensurate construction is satisfactory. In such cases the minimum retained balance of the guarantee shall be 25% of the original amount. Any reduction of these guarantees will only be considered after a written request has been submitted to the Township OCS during construction and after substantial completion.

- ii. In addition to the security and guarantee required by the Township noted above, the applicant shall post with YCUA guarantee for completion of the water supply system and wastewater system improvements as depicted on the approved detailed engineering plans.

The guarantees for YCUA shall be presented in the form of a cashier's check or irrevocable standby letter of credit for 100% of the engineer's opinion of cost for the proposed water supply system and wastewater system improvements, as defined in item I.C.1.c. An irrevocable standby letter of credit shall automatically renew on its own term for periods of no less than one year unless written notification to YCUA from the financial institution is received sixty days prior to its expiration date. This security shall remain on deposit with YCUA until final acceptance of the water supply system and wastewater system improvements as public utilities by the YCUA Board of Commissioners. At the time of final acceptance, the performance guarantee will be returned to the applicant upon receipt of a two-year maintenance and guarantee security.

Partial releases of the water supply and wastewater performance guarantee may be granted prior to acceptance upon request of the applicant, provided commensurate construction is satisfactory. In such cases the minimum retained balance of the guarantee shall be 25% of the original amount. Any reduction of these guarantees will only be considered after a written request has been submitted to YCUA during construction and after substantial completion.

- iii. A record drawing and easement guarantee in the form of a cashier's check is required prior to proceeding with construction. The Township Engineer will determine this amount based on an estimate of what it would take for the Township Engineer to complete this work. This deposit shall be made to either YCUA or the Township at the same time the construction services escrow is established. If AutoCAD drawings are not provided immediately following detailed engineering approval, the cost will also be based on performing a full topographical survey.
- iv. Additional guarantees may be required by other affected agencies.

c. Construction Fees, Escrows and Other Deposits

All past review fees not paid to date to either the Township or YCUA must be paid in full prior to commencement of construction.

All YCUA trunk line and transmission charges, YCUA benefit charges, YCUA tap fees and the construction phase escrow deposit shall be paid to YCUA prior to the start of any construction. Information regarding trunk line and transmission charges, benefit charges, and tap fees are available by contacting the YCUA Engineering Department at 734-484-4600. All fees should be verified with Ypsilanti Township and/or YCUA for annual updates.

- i. The applicant shall establish a construction phase escrow account in accordance with Section 2306, Fees, of Appendix A – Zoning of the Charter Township of Ypsilanti Code of Ordinances and as specified herein to cover costs associated with the inspection of all public improvements. This account shall be maintained by either Ypsilanti Township or YCUA.
- ii. The construction phase escrow deposit amount will be determined based upon one of the following methods:
 - The deposit will be based on the estimated duration of the construction operations based on typical construction production rates.
 - The deposit may be adjusted based on the schedule proposed by the applicant's contractor. Said schedule shall be provided to the Township Engineer no later than one week prior to the pre-construction meeting.
- iii. On deposits made with the Authority, YCUA will add a non-refundable administrative fee amounting to 1% of the total construction cost as outlined on the approved final engineer's opinion of cost. This fee shall be paid at the time the construction phase escrow account is established.
- iv. On deposits made with Ypsilanti Township, the Township will add a refundable administrative fee amounting to 1% of the total construction cost as outlined on the approved final engineer's opinion of cost. This fee shall be paid at the time the construction phase escrow account is established. Any money left over when the project is complete will be released.
- v. The applicant shall deposit the construction phase escrow monies with Ypsilanti Township or YCUA at least 48 hours prior to the pre-construction meeting. For smaller projects, typically those that do not include underground utility construction, the Township may have the construction phase escrow deposit placed with the Township OCS Department. Instructions regarding the construction phase escrow and with whom it is to be placed will be provided in the pre-construction requirements letter from the Township Engineer. The applicant shall provide the Township Engineer with a copy of the receipt verifying that the appropriate deposit has been made with either entity.
- vi. In addition to the observation of the public improvements, the escrow account will be used to reimburse YCUA and/or the Township Engineer for construction phase effort including review of any field design changes or evaluations/interpretations of the plans, review of record drawings and easements, and any other work associated with bringing the site into conformance with the standards.

- vii. Construction phase services will be invoiced monthly against the construction phase escrow account based upon the established hourly rate by YCUA and/or the Township Engineer. The Township engineer will track these escrow accounts and if necessary send notifications to the attention of the Township, YCUA, and the applicant if production rates are less than anticipated, and create the possibility of a deficit or negative balance. The Township engineer will monitor and send notices to the Township, YCUA and the applicant at 50% escrow depletion and 90% escrow depletion if the actual production rate in the field is behind the rate in which escrow is being depleted. If additional deposits are required, then YCUA or the Township will determine an appropriate amount using the same method and adjusting production rates to an appropriate and more realistic level.
- viii. Prior to reaching a negative balance, all construction services will be stopped until the applicant deposits additional escrow monies with YCUA or the Township. In addition, YCUA will add a nonrefundable administrative fee amounting to 5%, and the Township will add a refundable administrative fee amounting to 5%, of the additional escrow deposit to be paid at the time the additional funds are deposited with YCUA. Prompt attention to maintaining the account will prevent construction operations from being stopped and/or occupancy permits withheld.
- ix. Upon formal acceptance of the project, any funds remaining in the construction phase escrow account will be returned to the applicant.

d. Insurance

Prior to the construction the applicant’s contractor will procure and maintain, during the term of the project, public liability and property damage insurance with a responsible insurance company which meets the approval of the Charter Township of Ypsilanti. The amounts must be adequate to protect the public and all parties of interest, and will not be less than the limits set forth as follows:

Type of insurance:

- i. Workmen’s Compensation Insurance and Employer’s Liability. Limits as required by laws of the State of Michigan
- ii. Public Liability and Property Damage:
 - Bodily Injury: Each Occurrence: \$500,000
 - Aggregate: \$1,000,000
 - Property Damage: Each Occurrence \$250,000
Aggregate \$500,000
- iii. Owner’s and Contractor’s Protective Liability and Property Damage:
 - Bodily Injury: Each Occurrence \$1,000,000
 - Property Damage: Each Occurrence \$250,000
Aggregate \$500,000
Or combined single limit of \$1,500,000
- iv. Motor Vehicle, (including Owner, Hired and Non-Owned Vehicles):
 - Bodily Injury: Each Occurrence \$500,000

- Property Damage: Each Occurrence \$200,000
Combined single limit: \$1,000,000

Policies will be made available to the Charter Township of Ypsilanti and YCUA for examination as to their validity. Any undesirable exclusions deemed improper by legal opinion rendered to the Township and/or YCUA will be required to be removed.

Underground construction, where applicable, will be specified in the coverage.

Certificates of coverage signed by the insurance carriers will include a guarantee that 30 days written notice will be given by the insurance carrier to the Township and YCUA prior to cancellation of, or any change in, the respective policies. In the event that the insurance is cancelled, operations will cease prior to the cancellation date and will not resume until evidence is provided that proper insurance is again in effect.

Additional Named Insured under Owners and Contractors Protective Liability and Property Damage Insurance will include the Charter Township of Ypsilanti; the Ypsilanti Township Board of Trustees, jointly and individually; all Ypsilanti Township employees; the City of Ypsilanti; the Ypsilanti City Council, jointly and individually, and all City of Ypsilanti employees; the YCUA Board of Commissioners, jointly and individually; all YCUA employees, agents, and consultants, individually.

e. Construction Drawings

Prior to the pre-construction meeting, the applicant's design engineer shall submit six sets of the approved detailed engineering plans to the Township Engineer for processing and distribution to the appropriate parties. In addition, digital versions of the construction drawings shall be provided that include both AutoCAD and Adobe PDF files. AutoCAD data shall be projected to State Plane Coordinates and shall use NAVD '88 vertical datum.

3. Construction Phase

a. Pre-Construction Meeting

Prior to starting any construction operations, the applicant must obtain all required permits and attend a pre-construction meeting. Unless otherwise specified, all meetings will be held at the Township Civic Center. The applicant shall contact the Township OCS to schedule the meeting. The Township shall notify all required and applicable attendees in writing outside of the local agencies listed in Section I.B.1.

Attendees at the pre-construction meeting (as well as any project progress meetings) shall include representatives from the Township, YCUA, the Township Engineer, the Building Department Director, the Fire Marshal, the applicant, the applicant's design engineer, the applicant's prime contractor and underground contractor. In addition, representatives from any utility companies whose facilities may be affected by the project as well as any state, county or other agencies having jurisdiction over portions of the project shall be invited to attend. It shall be the responsibility of the applicant to contact the Township Engineer a minimum of 10 calendar days prior to the desired start of construction to

schedule the pre-construction meeting. The pre-construction meeting shall be scheduled a minimum of 5 days prior to the start of construction. The pre-construction meeting will not be scheduled until all required approvals and documentation is received by the Township OCS. Pre-construction meeting forms are included in Appendix C.

b. Construction

The Township, YCUA or designated representative(s) of those entities will provide observation of construction of all public utilities and improvements within 10 feet of any proposed or existing building. Observation will be full time on water supply systems, wastewater facilities, storm water management facilities, sidewalk ramps connecting to the street or sidewalk along common areas, and approaches in the public right-of-way. Part time observation will be performed for all on-site paving, grading, and soil erosion and sedimentation control measures. On all part time observation items, the contractor or applicant shall provide third party certifications, density and/or material testing reports if requested by the Township, YCUA or designated representative(s) of those entities.

Any work occurring within 10 foot of any existing or proposed building may require the inspection and permit of the Ypsilanti Township Building Department. Prior to working within this 10 foot envelope, the Ypsilanti Township Building Department must be contacted.

The Washtenaw County Road Commission will provide inspection for work within the existing public right-of-way and on any road improvements that will be dedicated as public facilities.

The Washtenaw County Water Resource Commissioner's office will provide inspection for work associated with county drains or other water courses within their jurisdiction. The Township, or their designated representative(s) may provide assistance observing portions of the project for the other agencies.

The applicant or the applicant's contractor shall notify the Township, YCUA or designated representative(s) of those entities a minimum of 3 working days prior to the start of any construction operations.

All improvements requiring observation shall be field staked in accordance with the approved detailed engineering plans. The applicant shall be responsible for the field staking and provide appropriate cut sheets to the Township, YCUA or designated representative(s).

Deviations from the approved detailed engineering plans that are determined by the Township, YCUA or designated representative(s) to be significant will require review and approval of the Township, YCUA or designated representative(s) prior to staking and construction of the revised work. Deviations that are deemed to be significant will need to be submitted in writing (with revised plans as necessary) to the Township, YCUA or designated representative(s) for review.

The applicant's contractor shall be responsible for ensuring that all construction operations are conducted in conformance with the current MIOSHA safety standards.

c. Substantial Completion

At the completion of the installation and successful testing of all underground utilities and completion of the majority of paving improvements, said facilities will be subject to a preliminary walk-through inspection. This preliminary walk-through may include representatives from YCUA, the Township, the Township Engineer, and other appropriate agencies. At this meeting a preliminary punch list will be generated and distributed by the Township Engineer. Once all punch list items are addressed to the satisfaction of the Township Engineer a substantial completion letter will be issued by the Township Engineer. Only after this point can performance guarantees be reduced. This may be accomplished by submitting a request in writing to the Township OCS and/or YCUA depending on the guarantee that being considered for reduction. The applicant should understand that substantial completion does not in any way represent final acceptance. The substantial completion letter will indicate all remaining items that need to be completed. After substantial completion, the utilities are still under the ownership of the applicant and not that of the respective agency.

During the time between the substantial completion and final acceptance of the underground utilities and paving improvements, said facilities will be subject to periodic inspection by the Township, YCUA or designated representative(s) during the completion of all surface improvements (commercial buildings, residences, etc.).

Upon the completion of all improvements associated with the project, underground utilities and paving improvements will be subject to a final walk-through inspection. No facilities to be designated as public will be accepted until they have passed the final walk-through inspection. The applicant shall be responsible for providing all labor and equipment to accommodate inspection of the system(s) by the governing municipality and/or agencies having jurisdiction over the project. A project cannot receive a final walk-through inspection until all landscaping is complete and all portions of the site are complete. For residential projects, a final walk-through inspection will not be conducted until the site is 90% complete (Certificate of Occupancy issued). All final walk-through inspections shall include one representative each from YCUA, the Township, the Township Engineer and the applicant's representative.

4. Project Completion

a. Record Drawings

To ensure that accurate records exist for all newly installed infrastructure within Ypsilanti Township, a set of record drawing requirements has been created. All projects require that accurate record drawings are produced and approved in advance of final project acceptance.

It is required that the applicant submit a complete digital file of the construction drawings including all details, plan and profile views to both Ypsilanti Township and YCUA at the time of the pre-construction meeting. The digital file should follow the template for digital submittals that is located in the Digital Appendix.

The applicant shall post a guarantee in an amount determined by YCUA and/or the Township Engineer to ensure completion of the record drawings in a timely

manner. The record drawing guarantee shall be presented in the form of a cashier's check, cash deposit, or irrevocable standby letter of credit.

The applicant has 90 calendar days after substantial completion (from date of the issued substantial completion letter) to prepare and submit to the Township Engineer an approvable set of record drawings. These record drawings will be submitted in a digital format (AutoCAD and pdf) and on bond and Mylar. Digital record drawing specifications are included on the Digital Appendix CD.

In the event the applicant fails to submit the required approvable record drawings to the Township Engineer within the 90 day period, the Township/YCUA will utilize the applicant's record drawing guarantee to have the required record plans prepared by the Township Engineer.

If this occurs, the Township and/or YCUA will direct the Township Engineer to prepare the record drawings utilizing the digital plans previously submitted. Once this notification to proceed has been given to the Township Engineer, delivery of the record drawings to the Township/YCUA will be made within 90 days of that date.

A copy of the record drawing requirements checklist is provided in Appendix A.

b. Easements

The applicant shall have easement documents prepared for all public sanitary sewer and water main on site unless located in a public right-of-way. In addition, any public storm sewer not in a public right-of-way or ingress/egress easements shall have easement documents prepared and submitted to the Township Engineer and the appropriate legal counsel for review and approval. Once easements are approved, the easement shall be forwarded by the applicant to the County Register of Deeds and recorded. Copies of recorded easements shall be forwarded to the Township Engineer, YCUA and the Township for their records. Sample easement documents for water supply and wastewater systems can be found in Appendix D of this document.

c. Grading Certificate

The applicant shall submit a grading certificate upon the completion of construction certifying that site grading was completed in accordance with the approved detailed engineering construction plan. The grading certificate shall be signed and sealed by a Professional Engineer or Surveyor licensed to practice in the State of Michigan. A blank grading certificate is provided in Appendix E of this document.

d. Maintenance and Guarantee Surety

Prior to final acceptance by the YCUA the applicant shall post with YCUA a two-year Maintenance and Guarantee security. The guarantee shall be presented in the form of a cashier's check or irrevocable standby letter of credit for 50% of the engineer's opinion of cost of the proposed water supply system and wastewater system improvements, as defined in item I.C.1.c. It should be noted that other agencies having jurisdiction over the project or any portion thereof might also require maintenance guarantees.

e. Final Acceptance

Final acceptance will not be made until all improvements shown on the approved detailed engineering plans are completed. In addition, all other requirements as outlined in the pre-construction requirements letter or, if applicable, a development agreement must be completed. For residential developments, final acceptance of the water supply system and wastewater system improvements will not take place until at least 90% of the residences are built and occupied.

SECTION II – SITE PLAN REVIEW PROCESS

A. Introduction

Site plan review is a process to review new developments or changes to existing developments. The goals of the site plan are to achieve efficient use of the land, protect natural resources, minimize adverse impacts on nearby properties, and encourage cooperation and consultation between the applicant and Township to facilitate accordance with the Township's land use objectives.

Per Section 2115 of the Township Zoning Ordinance, preliminary site plan review and approval are necessary for: a change of use, expansions or additions, development of subdivisions, condominiums, site condominiums, multiple family dwellings, commercial, office or industrial buildings. Please review Section 2115 for specific items that must be included with your plan submittal.

1. Pre-application meeting

The applicant is encouraged to schedule a meeting with the Township Office of Community Standards to discuss the project, submittal requirements and review procedures. The purpose of this meeting is to discuss applicable standards and technical issues, and to determine the appropriate type of review process based on Table 2115.1 of the Township Zoning Ordinance.

Within 7 days of the meeting, Township staff will provide the applicant and all attendees with a sign in sheet including contact information for all attendees and a written report of the comments and/or suggestions provided during the pre-application meeting.

2. Preliminary site plan submission

Applicant shall submit a preliminary site plan with the specific items in Section 2115. Review fees shall be enclosed as part of a complete site plan application.

3. Preliminary
Site Plan
distribution of
application

The Office of Community Standards will process and distribute the provided site plan application to the following review agencies for comment (Township Planner, Township Engineering, Township Fire Department, Township Assessing Department, Ypsilanti Community Utility Authority (YCUA), Ann Arbor Area Transportation Authority (AAATA), and the Washtenaw County Sheriff's Department). A separate fee to YCUA is required. This process may take up to 3 weeks to complete. The applicant is responsible for delivering plans, appropriate applications and fees to the following agencies: Washtenaw County Road Commission (WCRC), Washtenaw County Water Resource Commissioner (WCWRC), and, if applicable, the Michigan Department of Transportation (MDOT).

4. Planner/Staff
review

Once all reviewing agencies have completed the necessary reviews, the Township Planning staff will determine whether the application is complete and can be presented to the Township Planning Commission or if the plans must be revised and then resubmitted for further review. Plans that are found not to be completed per the adopted ordinances will not be presented to the Planning Commission for consideration. Please note that any additional reviews will require that the initial fee be resubmitted for the additional preliminary site plan review(s).

5. Preliminary site
plan Planning
Commission
approval/
recommendation

At the Planning Commission meeting, after a presentation by staff and then the applicant, the Planning Commission may either postpone action or recommend approval or denial to the Township Board (when applicable), approve, approve with conditions, or deny the submitted application.

6. Township Board approval (if necessary)

The Township Board grants preliminary site plan approval for the following developments: subdivisions, condominiums or site condominiums, planned developments, multi-family residential developments, and wireless communication towers. Written correspondence outlining the recommendation or decision of the Township Board will be sent to the applicant within 7 days of said decision.

Effect of preliminary site plan

Any preliminary site plan approval expires after one year from the date of approval. The applicant may request a one year extension from the Planning Commission, provided a written request is received before the expiration date and the site plan complies with current standards.

7. Final site plan submission

The applicant shall submit a final site plan with the specific items found in Section 2115.

8. Final site plan distribution of application

The Office of Community Standards will process and distribute the final site plan application to the following review agencies for comment: Township Planner, Township Engineering, Township Fire Department, Township Assessing Department, Ypsilanti Community Utility Authority (YUCA), Ann Arbor Area Transportation Authority (AAATA), and the Washtenaw County Sheriff's Department. A separate fee to YCUA. This process may take up to 3 weeks to complete. The applicant is responsible to deliver plans, appropriate applications and fees to the following agencies: Washtenaw County Road Commission (WCRC), Washtenaw County Water Resource Commissioner (WCWRC), and if applicable, the Michigan Department of Transportation (MDOT). Once all reviewing agencies have completed the necessary reviews and approved said project, the Township Planning staff will review final site plan.

9. Planner/Staff
review and
Approval

Final site plan approval may be given administratively when all conditions set forth herein for final site plans are complied with except the planning commission may, at the time of preliminary site plan approval, require final site plan approval by the commission as well.

10. Township
Board approval
(if necessary)

The Township Board shall grant final site plan approval for the following developments: subdivisions, condominiums or site condominiums, planned developments, multi-family residential developments, and wireless communication towers. Written correspondence outlining the decision of the Township Board will be sent to the applicant within 7 days of said decision.

Effect of final site
plan approval

The approval of any final site plan, other than subdivisions, expires one year after the date of approval, unless actual construction and development have been commenced in accordance with said site plan. If construction and development begins within the one year period, then the approval shall continue for five years from the construction date. If substantial construction and development does not occur for a year, the approval will expire.

SECTION II – SITE PLAN REVIEW PROCESS CHECKLIST

Information required for pre-application meeting:

- Fees
- 7 – 11 x 17 copies of the proposed plan
- 1 PDF copy of the proposed plan
- Completed pre-application meeting application
- Proof of property ownership

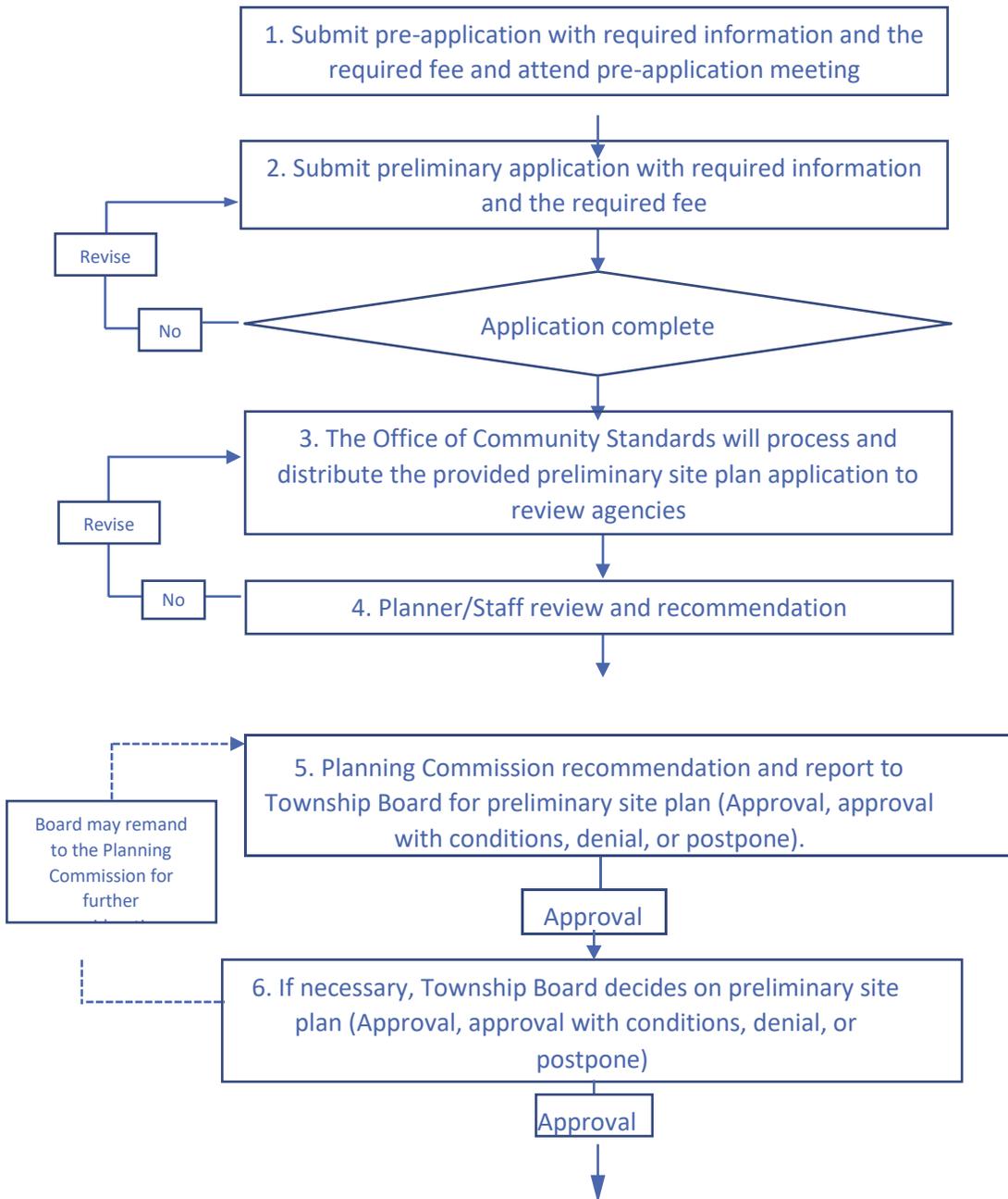
Information required for preliminary site plan submission:

- The applicant shall submit 7 signed and sealed copies (24" x 36"), one reduced copy (11" x 17") and one digital copy (PDF format).
- Two signed and sealed copies (24" x 36") shall be provided to the Washtenaw County Road Commission and Water Resources Commissioner's Office for Review. The applicant is responsible for delivery of the plans, application and applicable review fees to these agencies. The Township will complete distribution to Ypsilanti Community Utility Authority (YUCA), but separate payment is required.
- The site plan review application signed and dated by the applicant and the property owner if not the same.
- Proof of property ownership
- A Woodland Protection application or No Tree Affidavit (if applicable)
- A copy of the Traffic Impact Questionnaire.
- A written description of the project.
- A check in the amount stated within the adopted fee schedule. Please contact Office of Community Standards at 734-485-3943 or by email at planningops@ytown.org for an exact amount and breakdown of the required review fees. Plans will not be accepted without the payment of the noted fee. Please also note, the same site plan review fee will be charged for each subsequent submittal per the adopted fee schedule.

Information required for Planning Commission:

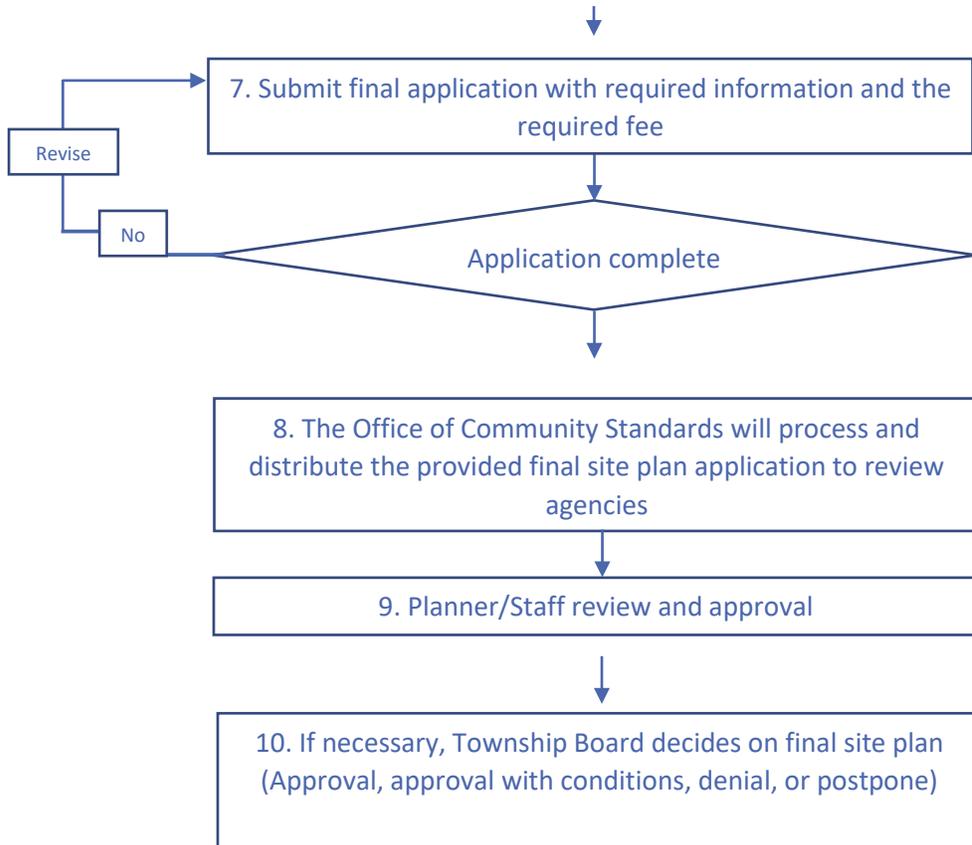
- Three (3) full size sets of site plan (24" x 36")
- One digital copy of site plan (PDF format)
- Color Elevation Drawings (PDF format)

FLOWCHART



Continue flowchart on next page

Continued from previous page



III. TOPOGRAPHIC SURVEY

General Requirements

1. A complete topographical survey is required for all proposed projects. A metes and bounds legal description of the project site shall be provided on the plans. Property lines shall be indicated by bearing and distance in the plan view. All existing easements shall also be shown on the plan view of the existing conditions.
2. A minimum of two benchmarks are required for vertical control. All benchmarks shall be clearly indicated on the plans. All elevations shall be to North American Vertical Datum – 1988 (NAVD-88).
3. Horizontal control shall be established for each site utilizing Michigan State Plane Coordinates, Michigan South Zone Coordinate System NAD 83 (CORS).
4. Existing offsite elevations must be given at a minimum of 50 feet and 100 feet abutting the entire perimeter of the site. Grades will be indicated at all property corners and along all property lines. On-site, intermittent elevations and/or defined contours (minimum contour interval of 2 feet) are required to establish the existing site drainage patterns.
5. Existing features shall be located and shown within 100 feet of the project. Existing features to be shown shall include, but may not necessarily be limited to the following items:
 - a. Ditches.
 - b. Culverts.
 - c. Water supply system, storm water management and/or sanitary sewer facilities, including inverts and casting elevation at all structures.
 - d. Gas, telephone, electric and cable television lines, including manholes and/or utility poles.
 - e. Pedestrian facilities.
 - f. Trees and other landmark vegetation.
 - g. All streams, lakes and/or county drains with names shown.
 - h. Existing buildings and permanent structures.
6. Existing adjacent roads and existing right-of-way or easement lines shall be shown on the plans and shall extend across the entire site with grades shown on both sides of the road for:
 - a. Right-of-way or easement line.
 - b. Ditch centerline.
 - c. Top of bank.
 - d. Edge of shoulder.
 - e. Edge of pavement or top of curb.
 - f. Crown or centerline.

IV. WATER SUPPLY SYSTEM

General

1. Water supply system improvements shall be designed and constructed in accordance with the requirements of the Michigan Safe Drinking Water Act, Act 399 of the Public Acts of 1976, as amended; as well as the latest revisions of the standards and manuals of practice published by the American Water Works Association (AWWA), the Great Lakes Water Authority (GLWA), and as specified herein.
2. All water supply system improvements will require the review and approval of Ypsilanti Community Utilities Authority (YCUA). The majority of water supply system improvements will also require the review and approval of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and in certain instances GLWA. Water supply system components are typically considered public facilities when two or more service connections are made to the same water main. In most instances, multiple unit developments in particular, the water supply system may have to be public even though the project has one owner. The extension of water mains will generally be required across the entire frontage of the site.
3. YCUA approval will be required for connection of private water supply systems (“customer site piping”) to the public water supply system. Installation of and/or improvements to customer site piping will require installation of a master meter and/or suitable backflow prevention devices at any interfaces between the public water supply system and customer site piping.
4. Water supply system improvements identified in the latest revision of the YCUA Water System Master Plan may be required as part of the project. The applicant shall contact YCUA to determine if any improvements identified in the latest revision of the YCUA Water System Master Plan will need to be incorporated as part of the project.
5. Plan and profile views shall be provided for all proposed water supply system improvements including water mains and fire hydrant leads. The plan and profile shall be presented on the same plan sheet and shall be vertically oriented.
 - a. A water main quantity list shall be provided on the cover sheet of the detailed engineering plans. The quantity list shall be delineated by existing or proposed road right-of-way or easement.
 - b. The following information must be shown in the plan view of proposed water supply system improvements:
 - i. Type, class and size of pipe.
 - ii. Length between fittings and/or appurtenances.
 - iii. Water service locations and sizes. In addition to domestic water services, water services for fire suppression and/or irrigation purposes must be shown on the plans.

- iv. Where required, a dedicated water main easement must be shown on the plans. The easement width shall be the greater of the following: Twice the depth of bury plus the pipe diameter plus 2' (rounded to the next largest full foot), or 15'. Where water main is adjacent to and parallel to the right-of-way, a water main easement must be extended across the entire frontage of the property.
 - c. The following information must be shown in the profile view of proposed water supply system improvements:
 - i. Type, class and size of pipe.
 - ii. Length between fittings and/or appurtenances.
 - iii. Top of casting elevation on valve wells and/or boxes as well as the finished grade for fire hydrants.
 - iv. Crossing of all existing and proposed utilities, including leads.
 - v. Granular backfill, trench details, special bedding, bores and/or other special construction methods.
 - vi. Existing and proposed ground elevations.
 - d. Design details of joints and joint restraint, including any necessary design calculations, shall be provided on the plans.
 - e. Plans showing any proposed water supply system improvement, public and/or private, shall be accompanied by the YCUA water supply system standard detail sheets. The standard details are included in the Digital Appendix.
6. Connection of individual residences or buildings to water distribution mains will require the submittal of a utility service plan for review and approval by YCUA. Utility service plans can be submitted on 8½" x 11" paper or PDF document. The following information must be shown on the utility service plan:
- a. The applicant's name, address, telephone number, and electronic mail address (if available).
 - b. The name, address, telephone and fax numbers, and electronic mail address for the applicant's engineer/surveyor.
 - c. The utility service plan shall be prepared to a scale of 1" = 40'. The following items must be shown on the utility service plan:
 - i. A legal description of the parcel, including tax identification number, along with a sketch showing all property lines including the bearing and distance.
 - ii. All sides of the proposed or existing building.
 - iii. Existing and/or proposed driveways and sidewalks, including materials and thicknesses.
 - iv. Existing and/or proposed utilities on the parcel or in the adjacent public right-of-way or easement. Utilities to be shown include but may not necessarily be

limited to: water supply, wastewater, storm sewer, gas, telephone, electric, and cable television.

- v. Existing and/or proposed natural features such as trees, landscaped areas, berms, and ditches/drainage courses.
 - vi. Existing and/or proposed water services, building sewers, and storm sewer laterals (for sump pump discharges, if applicable). Information shall include proposed material and size. Dimension all pipes from the building corners; dimension the curb stop and box from the building corners.
7. Trunk line and transmission charges, benefit charges, as well as tap fees and meter fees associated may apply to water supply system improvements and/or connections to the existing water supply system. The schedules for these fees can be found on the YCUA website.

Design Criteria

1. Water Transmission and Distribution Mains

- a. The minimum size pipe allowed for use in the distribution system is 8" diameter. Other allowable pipe sizes for use in the distribution system are 12" and 16" diameter. The larger diameter distribution mains may be required as minimum for distribution on non-residential sites, major streets, collector streets and elsewhere as directed by YCUA. Water mains larger than 16" diameter are considered transmission mains.
- b. Water supply systems shall be designed to provide service from a double source of supply ("looped main") or, with the written approval of YCUA, to be provided service by a double source of supply in the future when adjacent properties are developed. Approval of a single source of supply will require the applicant to post a guarantee with YCUA to allow for provision of a double source of supply if adjacent properties do not develop within a reasonable time.
- c. Terminal dead end water mains with domestic service connections are not permitted without the written approval of YCUA. Where terminal dead end water mains are permitted, a gate valve and fire hydrant shall be provided at the terminus of the water main – this will be the only fire hydrant allowed on the dead end water main. The following are the maximum allowable lengths for terminal dead end water mains:
 - i. 40' for 6" diameter fire hydrant service pipe.
 - ii. 600' for 8" diameter water distribution mains (residential areas only).
 - iii. 1,000' for 12" diameter and larger water distribution mains.
- d. Wherever possible, water mains and appurtenances shall be located outside the influence of existing or proposed pavement. Within existing or proposed public road rights-of-way, water main alignments and appurtenance locations should be in accordance with the requirements of the agency having jurisdiction. Alignments and locations within private road easements should be in accordance with the requirements of the agency having jurisdiction over the adjacent public

road right-of-way. Water main alignments and appurtenance locations in easements outside of public road rights-of-way or private road easements will be evaluated individually.

- e. A minimum 10' horizontal separation shall be maintained between water main and sanitary sewers and/or storm sewers. A minimum 5' horizontal separation shall be provided between water mains and other underground utilities and/or structures.
 - f. Where water main alignments cross alignments of other utilities, the angle between the horizontal alignments at the crossing shall not be less than 45°.
 - g. Water main shall be designed and constructed with a minimum 5½' depth of cover over the top of pipe as measured from the proposed final grade. A minimum 18" vertical clearance shall be maintained between water mains and other underground utilities. Where the vertical alignment of the water main must be deflected in order to achieve the required vertical clearance, the length of the deeper main shall be kept to a minimum and standard 45° bends shall be used to achieve the necessary deflection. Depending on groundwater conditions, vertical alignment changes may be allowable utilizing joint deflection only when the elevation change is less than or equal to 18" and the depth of the water main remains above the groundwater elevation. Soil borings obtained from the site shall be provided to YCUA in order to determine if joint deflection will be acceptable.
 - h. Where changes in finish grade occur subsequent to installation of water mains or are proposed over an existing water main, all manhole castings, valve boxes, curb stop boxes, hydrants and blow-offs shall be adjusted to the revised grade as part of the project. When such changes in finish grade will result in a depth of cover of less than 5' or more than 7', the existing water main shall be relocated as part of the project in accordance with the requirements of item II. Design Criteria.1.g., Water Supply System, Design Criteria, Water Transmission and Distribution Mains.
 - i. Tracer wire shall be provided with all water main.
2. Joint Restraint
- j. Joints shall be restrained per the pipe material manufacturer's recommendations. For ductile iron pipe, joint restraint shall conform to the most current edition of the Ductile Iron Pipe Research Association's (DIPRA) Thrust Restraint Design Procedure for Ductile Iron Pipe or as approved by YCUA.
 - k. Concrete thrust blocks will not be permitted except behind hydrant shoes and tapping sleeves. Use of concrete thrust blocks in other locations will not be permitted without the written approval of YCUA. Where allowed, concrete thrust blocks shall bear against undisturbed earth in all instances and shall have sufficient bearing area to develop the full resultant axial thrust of the pipe at test pressure. The concrete thrust block shall not cover fastener nuts and/or threaded connections that would hinder future maintenance or repairs of fittings or valve assemblies.

3. Valves

- a. General

- i. Water supply system improvements shall be designed to include adequate valves to properly isolate sections of water main and control flow and pressure as needed without adversely impacting significant portions of the system.
 - ii. All valves shall be installed in a three-piece, adjustable valve box with the following exceptions: Valves shall be installed in wells, with Type I adaptor by Adaptor, Inc., where the valve will be located within existing or proposed (1:1) influence of the road, or the valve is located on a water main larger than 16" diameter, or the valve is part of a tapping valve connecting to an existing water main requiring tapping valves to be in wells.
 - iii. Valves shall be located such that the valve box cover or valve well cover will not be in street pavements, sidewalks or driveways.
- b. Isolation Valves
- i. Isolation valves on water mains 16" diameter and smaller shall be gate valves and valves on water mains larger than 16" diameter shall be butterfly valves.
 - ii. Valves shall be placed such that no more than three valves are required to isolate any section of water main (four maximum). More than three valves to isolate a section of water main will not be permitted without the written approval of YCUA.
 - iii. No more than 800' of water main may be out of service for 8" diameter water mains: not more than ¼ mile of water main may be out of service for mains 12" diameter and larger.
 - iv. No more than 2 fire hydrants may be out of service.
 - v. No more than 24 single family residences or 30 multiple family residences may be out of service.
- c. Tapping Valves
- i. The connection of proposed water mains to existing water mains shall be accomplished by means of a tapping sleeve and valve unless the connection can be made without interrupting service to existing customers, if the existing water main is 16" diameter or larger, or as otherwise directed by YCUA.
 - ii. Use of a tapping sleeve and valve will also require a separate isolation valve downstream of the connection.
- d. Control Valves
- i. Valves to control flow and/or pressure may be required to ensure proposed water supply improvements will not adversely impact the existing system or that the proposed improvements will operate as intended without being adversely impacted by the existing system.
 - ii. Such control valves, when deemed necessary by YCUA, shall be included in the design of the proposed water supply system improvements.

4. Fire Hydrants

- a. Fire hydrants shall be located per the requirements of the Ypsilanti Township Fire Department (YTFD) and shall reference the current International Fire Code.
- b. Hydrants within residential areas shall be located between the back-of-curb and sidewalk between 2' and 10' of the back of sidewalk of the cross street at intersections. A minimum of 5' is required from a vehicular path. Hydrants not located at the intersections shall be located at the extension of the side property lines between lots.
- c. Spacing of hydrants along water transmission mains and around multiple family residential, commercial or manufacturing establishments shall be considered on an individual basis and shall be determined by consultation with YCUA and the Township Fire Marshal.
- d. The distance of the hydrant from buildings will depend on the height of the building. The hydrant will be located at least a distance equal to the height of the building from the building's exterior walls. At a minimum, fire hydrants shall be located at least 25' from the exterior wall of any masonry building, and at least 50' from any exterior wall of frame or equivalent construction, including brick and stone veneer.
- e. All buildings with sprinkler systems shall have a fire hydrant located within 100' of the fire pumper hose Siamese connection located on the building exterior.
- f. Proper access shall be provided to all hydrants. A minimum 20' wide aisle shall be provided between the travel way and the hydrant. No parking shall be allowed within 15' of each side of a fire hydrant (measured perpendicular from the centerline of the hydrant to the road or travel way).

5. Water Services

g. General

i. Size

- (a) Domestic water services shall be a minimum of $\frac{3}{4}$ " diameter in the Township and 1" diameter in the City. Larger diameter domestic water services will require the review and approval of YCUA.
- (b) Irrigation water services for single-family residences and multiple family residences and non-residential properties with a single water service to the entire building shall be no larger than the domestic water service upstream of the domestic water meter. Sizing of irrigation water services for multiple-family residences and non-residential properties where the irrigation water service will be connected directly to a YCUA distribution main will be evaluated individually.
- (c) Fire suppression water services shall be designed by the applicant and require the review and approval of YCUA.
- (d) Larger diameter water services, when approved by YCUA, shall be at least one standard size smaller than the water distribution main it connects to.

ii. Responsibility for Connections

- (a) Connections to YCUA distribution mains for single-family residential property that does not require a permit from an agency having jurisdiction over work within a public road right-of-way will be completed by YCUA, except in circumstances where YCUA is unable to complete such work due to elevated groundwater table, excessive depth of existing distribution mains, or similar extenuating circumstances.
- (b) Connections to YCUA distribution mains for single-family residential property that requires a permit from an agency having jurisdiction over work within a public road right-of-way shall be the responsibility of the applicant.
- (c) Connections to YCUA distribution mains for multiple-family residential and non-residential properties shall be the responsibility of the applicant.
- (d) Connections to YCUA distribution mains solely for fire suppression or irrigation purposes shall be the responsibility of the applicant.

iii. Location

- (a) Water services shall be connected to distribution mains such that the water service pipe within the public road right-of-way or easement is perpendicular to the centerline of the public road right-of-way or easement.
- (b) The minimum allowable horizontal separations between water services and other facilities are as follows:
 - (1) Other water services – 2' each.
 - (2) Sanitary sewer leads – 3'.
 - (3) All other utilities and structures – 5'.
- (c) The curb stop and box or shut off valve on a water service shall be located at the right-of-way line for water services within public roads and the easement line for water services outside of public road right-of-way.
- (d) Curb stop boxes and/or shut off valves shall be located such that the stop box cover, valve box cover, and/or manhole cover will not be in street pavements, sidewalks or driveways. Where curb stops are allowed to be located in a paved surface by YCUA, they shall be protected with an approved sleeve.

- iv. YCUA will be responsible for maintaining the water service(s) and appurtenances from the YCUA distribution main up to and including the curb stop and box or shut off valve. The property owner will be responsible for maintaining the water service(s) and appurtenances from the curb stop and box or shut off valve, including the outlet coupling, to the building.

h. Domestic

- i. Each individual residence or building connected directly to the YCUA distribution main shall have a separate water service and curb stop and box. Multiple-family residences may be served either through separate water services to each unit or through a single water service to the entire building.

Non-residential buildings, even those with multiple tenants, shall have a single water service as only one YCUA meter will be issued.

- ii. No domestic service connections will be permitted from 6" fire hydrant leads or transmission mains. Combined domestic or irrigation and fire suppression services will not be permitted.
 - i. Irrigation
 - i. Irrigation water services for single family residences shall be connected to the domestic water service immediately upstream of the domestic water meter. Irrigation water services for multi-family residences and non-residential properties may be connected either directly to YCUA distribution mains or to the domestic water service upstream of the domestic meter.
 - ii. All irrigation systems connected to the water supply system shall be equipped with an approved backflow prevention device. Suitable backflow prevention devices include double check valve assemblies, reduced pressure zone assemblies, and pressure vacuum breakers.
 - j. Fire Suppression
 - i. Fire suppression services shall be completely separate from either domestic or irrigation water services.
 - ii. Fire suppression systems directly connected to a YCUA distribution main only, with no physical connections to other supplemental water supplies, will not require backflow prevention provided that no antifreeze or other additives of any kind are used and the sprinkler system drains to the atmosphere.
 - iii. Fire suppression systems directly connected to a YCUA distribution main and also having supplemental supplies of non-potable water, or being located within 500' of a body of water, shall be isolated from the YCUA distribution main by an approved backflow prevention device.
 - iv. Fire suppression systems directly connected to a YCUA distribution main and which incorporate an elevated storage tank for fire protection shall be isolated from the YCUA distribution main by an approved double check valve assembly.
 - v. Fire suppression systems shall be equipped with detector checks to prevent cross connections with the metered potable water system internal to the building.
6. Meters
- a. General
 - i. Each residence or building connected to the YCUA distribution system shall be equipped with a meter on each water service entering the property. Multiple-family residences with a single water service will be provided a single meter. All non-residential properties will only be provided a single meter. The user will be required to pay to YCUA a service charge equal to the cost of the

meter upon making application for service. Ownership of meters will remain with YCUA.

- ii. YCUA reserves the right to review and approve the size of meter requested for each meter installation. For premises to be served by a 1¼" or larger water service the applicant shall provide to YCUA a complete itemized building fixture count for use in the sizing of the meter and service.
 - iii. Irrigation systems connected to the water supply system shall be equipped with a meter. Irrigation meters for properties with a single domestic water service to the entire building shall be no larger than the domestic water service upstream of the domestic water meter. Irrigation meters for irrigation water services connected directly to a YCUA water distribution main will be evaluated individually.
 - iv. Fire suppression services shall be equipped with a ¾" diameter detection meter.
- b. Meter Locations
- i. Water meters shall be located in basements, utility rooms, boiler or mechanical rooms. The meter shall be positioned a maximum of 24" from the service entrance outside wall and located a minimum of 18" to a maximum of 48" above the basement or lowest floor. The meter shall always be located in an easily accessible area which is heated and protected from the weather. The locating of water meters in such areas as crawl spaces and under kitchen sinks, etc., is not considered an easily accessible area. Nothing shall be stored or placed in the area of the meter which would hinder YCUA personnel from accessing the meter for the purpose of reading, inspecting, repairing, or replacing it.
 - ii. Meters on irrigation water services connected directly to YCUA distribution mains where the meter cannot be located within a building shall be installed in an above ground meter enclosure, such as Lok Box as manufactured by Hot Box or approved equal.
 - iii. All meters shall be installed in a horizontal orientation. No vertical installations will be permitted.
- c. Master meters for multiple-family residential and non-residential properties are permitted, subject to the approval of YCUA. Water supply system components downstream of master meters will be considered customer site piping. Operation and maintenance of customer site piping will be the responsibility of the customer. Upon acceptance of the water supply system improvements, ownership and maintenance of the meter and vault will be the responsibility of YCUA. Master meters will be reviewed on an individual basis and shall include such auxiliary equipment as deemed necessary by YCUA, including but not necessarily limited to the following:

- i. Master meters shall be installed in an underground vault with adequate access provided to operate and maintain the meter, isolation valves, and appurtenances.
 - ii. Master meter vaults shall be protected from physical damage during a 100-year flood and remain operable and accessible during a 25-year flood.
 - iii. Master meter vaults and equipment shall be protected from vehicular traffic. Provisions for maintenance vehicles shall be provided, including pavement with sufficient space to park and maneuver as well as a curb cut to allow ingress/egress from the adjacent roadway.
 - iv. A sketch of the typical master meter vault layout, including some of the standard equipment requirements, is provided in Appendix B. The master meter vault must include an external bypass as well as redundant isolation valves both upstream and downstream of the meter. Master meter vaults shall be equipped with a steel bolt-on ladder and a Ladder Up Safety Post as manufactured by the Bilco Company or approved equal.
 - v. Electrical, instrumentation and control devices may be required.
7. Corrosion control in addition to polyethylene encasement may be required for ductile iron water main and appurtenances depending on, but not necessarily limited to, the following items: soil characteristics and/or proximity to petroleum pipelines. The designer shall contact DIPRA for evaluation and determination of the required corrosion control. A copy of DIPRA's evaluation and recommendation shall be provided to YCUA.
8. Design of other water supply infrastructure, including but not necessarily limited to pressure reducing valves, storage facilities, and booster pump stations, will be evaluated and approved by YCUA individually. Design of these types of water supply infrastructure will likely require electrical, instrumentation and control devices, including adequate alarms and backup power.
9. Tracer wire is required for all water system infrastructure. The design of the tracer wires and connection points must be reviewed and approved by YCUA.

Materials

1. Water Transmission and Distribution Mains
 - a. Water transmission and distribution main pipe shall be ductile iron manufactured in accordance with AWWA C151 (ANSI A21.51), latest revision thereof.
 - b. Ductile iron pipe shall be thickness class 350 for pipes up to 16" diameter and thickness class 56 for pipes 20" diameter and larger. Ductile iron pipe shall be standard cement double thickness lined in accordance with AWWA C104 (ANSI A21.4), latest revision thereof. Pipe exterior shall be seal coated with an approved asphalt seal coat.
 - c. If other materials are proposed for use, the applicant shall furnish the necessary design data for the proposed depth and operating conditions. Use of materials other than ductile iron will not be allowed unless approved by YCUA.

2. Fittings

- a. Fittings shall be ductile iron, 350 psi working pressure rating, meeting the requirements of AWWA C110 (ANSI A21.10), or AWWA C153 (ANSI A21.53) compact fittings, with cement mortar lining. Cement mortar lining shall meet AWWA C104 (ANSI A21.4) specification for a double thickness lining with an asphalt seal coat or fusion bonded epoxy meeting the requirements of AWWA C116, as approved by YCUA.

3. Joints

- a. Joints shall be push-on type meeting the requirements of AWWA C111 (ANSI A21.11). Mechanical or flanged joints will be allowed for special applications, subject to the approval of YCUA. Sealing gaskets, retainer glands and lubricants for joints shall meet the pipe manufacturer's specifications.
- b. The lubricant shall have no deleterious effect upon the color, taste or odor of potable water and shall not be corrosive to either the pipe or gasket.
- c. Where bell and spigot pipe and fittings may be necessary for connection to existing water mains, shop drawings of such pipe and fittings shall be submitted to YCUA by the applicant for approval.

4. Joint Restraint

- a. Ductile iron joints, where required, shall be restrained by an approved instant push-on restraining device or mechanical retaining gland.
- b. Push-on joints shall be restrained with approved instant joint-restraining devices such as Field Lok Gasket manufactured by U.S. Pipe Company or approved equal.
- c. Mechanical joint-restraining glands shall be the Megalug Series as manufactured by EBAA Iron or approved equal.
- d. Thrust blocks, where allowed, shall be made of 3,000 psi concrete and of adequate size and shape to resist all design working and surge pressures to which the main will be subjected.
- e. Harnessed joints and steel reinforced concrete anchorage may be required on pipes larger than 16" diameter.

5. Valves, Wells and Boxes

- a. Valves shall open counter-clockwise (left) in the Township and clockwise (right) within the City. All valves shall be equipped with an operating nut 2" square at the base tapering to 1 ⁵/₁₆" square at the top. The operating nut on clockwise-opening (right) valves shall be painted red.
- b. Gate valves shall be ductile iron body and bonnet, fully bronze mounted, reduced wall, resilient-seated valves with non-rising stems conforming to the applicable requirements of AWWA C500, C509, and C515, latest revisions. Valves shall have a minimum non-shock W.O.G. working pressure of 200 psi. The wedge shall be ductile iron with rubber-encapsulated seating surfaces. Stem shall be bronze of non-rising design with double O-ring packing.

- c. Butterfly valves shall conform to AWWA C504, latest revision, and GLWA Specification S-363, Butterfly Valves for Distribution System.
- d. Tapping Sleeves and Valves
 - i. Tapping sleeves, when specified, shall conform to AWWA C223, latest revision and shall be full length of heavy-duty stainless steel construction designed for use with the type of pipe to be tapped. Tapping sleeve body shall be 18-8 type 304 stainless steel. Flange shall be CF8 cast stainless steel. Bolts shall be 304 stainless steel. Gasket shall be full circumferential SBR compounded for water service. Tapping sleeve shall contain a test plug to assure seal prior to tapping.
 - ii. Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve.
- e. Swing check valves shall have a cast or ductile iron body and bolted cap with a minimum non-shock W.O.G. working pressure of 150 psi. Seats shall be bronze and shall be screwed into the valve body. The disc shall be bronze or cast iron with permanently rolled in bronze faces. The disc hinge pin shall have ANSI 125 pound standard drill flat-faced flanges unless otherwise specified or shown on the Plans. Valves shall have outside weighted arm.
- f. Air release valves when specified shall be designed to operate under a maximum operating pressure of 300 psi and capable of venting 200 CFFAS (cubic feet of free air per second). Valves shall be cast iron with bronze internal parts and Type 304SS float.
- g. Valve Boxes
 - i. Boxes shall be three-piece screw-type, gray iron, with 5¼" shaft, such as East Jordan Iron Works #8560 or approved equal. All valve boxes shall have a ½" diameter hole field drilled 3" below the top to accommodate tracer wire.
 - ii. Valve box lids shall be gray iron, non-locking, drop-in type, with the word "Water" in raised letters, such as East Jordan Iron Works #6800 or approved equal. Valve box lids shall be non-locking type unless otherwise directed by YCUA.
 - iii. Valve boxes installed over gate valves shall be equipped with a steel gate valve adaptor as manufactured by Adaptor, Inc., or approved equal. Valve boxes installed over butterfly valves shall be equipped with a steel butterfly valve adaptor as manufactured by Adaptor, Inc., or approved equal. Valve box bases shall not rest directly upon the valve assembly.
- h. Valve Wells
 - i. Valve wells and covers shall be provided in accordance with the requirements of item III.Materials.3, Wastewater System, Materials, Manholes and Vaults. Valve wells constructed over an existing water main shall have a doghouse mudded to an 8" thick cookie.
 - ii. Covers shall have the words "Water Supply" in raised letters spaced in from the periphery of the cover.

- iii. Valves in wells shall be at least 6" above the floor of the well, supported with either precast or formed concrete.
- iv. Connections of water mains 6" through 24" diameter to valve wells shall be through:
 - (a) A flexible rubber boot which shall be securely clamped into a core-drilled pipe port. Pipe ports shall be core-drilled at the point of valve well manufacture and shall be accurately located within 1/2" of proposed water main centerline (Kor-N-Seal or approved equal).
 - (b) A self-adjusting mechanical pipe to manhole seal which provides a resilient flexible and infiltration-proof joint (Res-seal or approved equal).
 - (c) A flexible rubber wedge firmly rammed into a rubber gasket which is cast into the valve well (Press Wedge II or approved equal).
 - (d) Neoprene rubber for the manhole boot shall meet ASTM Specification C443 and shall have a minimum thickness of 3/8". Pipe clamp bands shall be of corrosion-resistant steel.
 - (e) Connection of water main larger than 24" diameter to valve wells shall be as approved by YCUA.
 - (f) Valve wells shall be water tight. Infiltration wrap shall be used to seal the joints and adjustments. The standards for sanitary manholes, joints, and adjustments applies to water wells.

6. Fire Hydrants

- a. Fire hydrants shall be East Jordan Iron Works Model 5-BR250 or Mueller A-425 Super Centurion, conforming to AWWA C502, breakable flange type, opening counter-clockwise, with 5 1/4" valve seat opening and 6" diameter inlet. All hydrants shall be 6' bury.
- b. Fire hydrants shall be fully bronze mounted, including top of the operating stem where it passes through the double o-ring seal in the bronze packing gland. The forged operating stem in the base and the valve seat shall also be of bronze. The molded valve shall be of composition rubber and the cast iron valve clamps shall be packed with o-ring seals and held tight to the stem by a threaded bronze hex retainer ring and threaded bronze locknut, anchored with set screws.
- c. Hydrants shall have nut type caps with chains. Top operating nut shall be 1 1/2" pentagonal.
- d. Hydrants shall have one 3 1/2" (4.05" O.D.) pumper connections with National Standard 7 1/2 threads per inch. All hydrants shall have City of Ann Arbor specification thread pattern.
- e. All hydrants shall have one 4" Storz adapter. The adapters shall be constructed of a A-356 High Strength Aluminum Alloy, painted orange. The Storz sealing surface shall have a machined metal seat. The threads and metal seat areas shall be Teflon coated. The adapters shall be equipped with a set of Type 302 stainless steel butterfly vanes designed to automatically open, by use of stainless steel torsion spring, with water flow and automatically close when flow is stopped. The adapter shall be installed on the left side of the hydrant when facing the hydrant.

- f. All hydrants shall be constructed with a companion gate valve in a valve box, located 3' from the center of the hydrant.

7. Water Services

- a. Water services $\frac{3}{4}$ " to 2" in diameter shall be Type K copper. Pipe material for water services larger than 2" in diameter shall be in accordance with the Materials portion of this Section (II-11). Water service pipe material shall be homogeneous between the YCUA distribution main and the outlet coupling downstream of the meter.
- b. Couplings for water services $\frac{3}{4}$ " to 2" diameter shall have a three-part union, and both inlet and outlet connections shall be able to receive the flared end of the copper water service pipe. Joints for water service pipe material larger than 2" diameter shall be in accordance with the Materials portion of this Section (II-11).
- c. Water service locations shall be marked at the right-of-way or easement line with a Utility Warning Marker as manufactured by Carsonite International, or approved equal.

8. Corporation Stops

- a. Corporation stops shall have bronze cast bodies and shall conform to the requirements specified in AWWA C800, latest revision. The outlet connection shall be able to receive the flared end of the copper water service pipe. Corporation stops connected to ductile iron, cast iron, steel or PVC water distribution mains for water services $\frac{3}{4}$ " to 2" diameter shall be Mueller Catalog No. B-25000N – Ball valves.
- b. Corporation stops adjacent to valves and other appurtenances shall be 1" diameter.
- c. Service saddles, for corporation stops not threaded directly to the water distribution main, shall be bronze with double stainless steel straps and shall conform to the requirements specified in AWWA C800, latest revision. Service saddles for water services $\frac{3}{4}$ " to 2" diameter shall be Mueller BR2S Series or approved equal.

9. Curb Stops and Boxes

- a. Curb stops shall be fully bronze and both inlet and outlet connections shall be able to receive the flared end of the copper water service pipe. Curb stops for water services $\frac{3}{4}$ " to 2" diameter shall be Ford B22-####NL Series or approved equal.
- b. Curb boxes shall be extension type with arch pattern base with 1" upper section such as Series 5601 for $\frac{3}{4}$ " and 1" diameter curb stops and Series 5603 for 1 1/4" to 2" diameter curb stops as manufactured by A.Y. MacDonald Mfg. Co. or approved equal. Curb box lids shall be cast iron with a one-piece two-hole Erie pattern lid such as 5601L as manufactured by A.Y. MacDonald Mfg. Co. or approved equal. Curb boxes located in paved surfaces shall be equipped with a cast iron curb box sleeve such as Mueller H-10342 or approved equal.

- c. Curb stops and boxes shall be provided with a stainless steel stationary shut-off rod attached to the curb stop with a stainless steel pin. The top of the rod shall be located within 3' of the surface.

10. Meters

- a. Except for master meters, meters will be furnished and installed by YCUA.
- b. Master meters 12" and smaller shall be Class 2 Turbine Meters manufactured by Sensus or approved equal. Compound meters are acceptable, subject to review and approval by YCUA. Meters larger than 12" diameter will be considered on an individual basis. Registers on master meters shall be Intelligent Communications Encoder as manufactured by Sensus or approved equal and shall indicate consumption in cubic feet.
- c. Master meter vaults shall be precast reinforced concrete in accordance with the requirements for manholes and vaults outlined in Chapter V, Wastewater System.
- d. Master meter vaults shall be equipped with steel bolt-on ladders and ladder up safety post as manufactured by Bilco Company or approved equal.

11. Backflow Prevention Devices

- a. Double check valve assemblies shall conform to the requirements specified in AWWA C510, latest revision.
- b. Reduced pressure zone assemblies shall conform to the requirements specified in AWWA C511, latest revision.
- c. Pressure vacuum breakers shall conform to the requirements specified in ANSI 1020, latest revision.

12. Corrosion Control

- a. Polyethylene encasement shall be installed on all ductile iron water main, fittings and appurtenances. Polyethylene encasement shall meet the requirements specified in AWWA C105 (ANSI 21.5), latest revision. Polyethylene encasement shall be a minimum of 8 mil thick Class aC (white) polyethylene. The encasement shall overlap the joint by approximately 12" on either side and be secured to the pipe with polyethylene adhesive tape. All pipe, fittings and appurtenances shall have enhanced polyethylene encasement that addresses, specifically, the potential influence of anaerobic bacteria and inhibits the formation of corrosion cells under the wrap.
- b. Additional corrosion control materials, if necessary, shall be in accordance with the recommendation of DIPRA.

13. Miscellaneous Materials

- a. All nuts and bolts located below grade shall be Core Blu (Trumbull) or R-Blue (Romac bolts) type steel.
- b. Tracer Wire
 - i. Wire to be used for tracer purposes shall be 12 gauge or greater, steel core, copper clad, Copperhead EHS, or Engineer approved equal.
 - ii. Connection shall be made using snake bite mainline or locking connector, or Engineer approved equal.
- c. Post Indicators and Valves
 - i. Post indicators, when specified, shall be American Flow Controls series A240 or Clow series 2954A with aluminum plates indicating OPEN or SHUT. Post indicator shall open left.
 - ii. Post indicator valves shall be American Flow Control Model 2500 or Clow model F-6120. All valves shall open left.
 - iii. Post indicators and their corresponding valves must be made by the same manufacturer.
- d. Bollards shall be 4" diameter galvanized schedule 40 steel posts 36" to 48" tall with a minimum depth of bury of 24". The posts shall be set in and filled with 3000 psi concrete. Bollards shall be painted OSHA "Safety Yellow."
- e. Casing Pipe Construction
 - i. Spacers for placement in the annular space between the carrier pipe and a casing pipe shall be Ranger II as manufactured by PSI or approved equal.
 - ii. End seals shall be Model C rubber seal with stainless steel bands as manufactured by PSI or approved equal.
- f. Materials for other water supply system infrastructure, including but not necessarily limited to pressure reducing valves, storage facilities, and booster pumps stations, will be evaluated individually.

Construction Methods

1. General

a. Excavation

Excavation, bedding, and backfill operations shall be accomplished in accordance with requirements outlined in Chapter VI, Grading and Earthwork, except as modified herein.

b. Water Use

Subject to the approval of YCUA, the proprietor can use the existing water supply system to obtain water needed to complete the water supply system improvements. The proprietor shall provide suitable backflow prevention for any temporary connections to the existing water supply system. As directed by YCUA, any water used from the system may be required to be metered and paid for at the current YCUA water usage rate in effect at the time of the construction of project.

c. Valve Operation

Unless directed otherwise by YCUA, operation of valves on the existing water supply system will be the responsibility of the contractor performing the work. All valve operation performed by a contractor shall be observed by YCUA and/or its designated representative. Advance notice to YCUA and/or its designated representative as well as any YCUA customers whose water supply will be interrupted by the valve operation is required. Such advanced notice shall be the responsibility of the contractor and two business days will be required prior to a scheduled contractor valve operation. Service interruptions shall only be scheduled to occur Monday through Thursday.

2. Submittals

a. Certifications

All pipe, fittings, and appurtenances delivered to the job shall be accompanied by certification papers showing that the materials have been manufactured and tested in accordance with all applicable standards.

b. Shop Drawings

Shop drawings may be required for certain materials including, but not necessarily limited to, corrosion control measures, pressure reducing valves, storage facilities, and booster pump stations, prior to fabrication and manufacture.

3. Delivery, Handling, and Storage

- a. Water supply system materials shall be delivered, handled, and stored in accordance with all applicable AWWA requirements, manufacturer's recommendations, and as specified by YCUA.

- b. Upon delivery to the project site all materials will be inspected by YCUA or its designated representative. Rejected materials shall be immediately removed from the project site by the proprietor.

4. Sequencing

In general, water supply system improvements shall be constructed in accordance with the following sequence:

- a. Install new water main and appurtenances.
- b. Poly pigging.
- c. Preliminary hydrostatic testing (recommended, performed at the proprietor's discretion).
- d. Disinfection.
- e. Flushing.
- f. Bacteriological testing.
- g. Hydrostatic testing.
- h. Connect to existing water supply system.
- i. Full flush at 2 feet/second or greater.
- j. Connect water services to new water main; abandon/remove old water main and/or appurtenances (if necessary).
- k. Abandon and/or remove out-of-service water main and appurtenances, if necessary.

5. Installation

- a. Water Transmission and Distribution Mains and Fittings
 - i. Ductile iron pipe and fittings shall be installed in accordance with the requirements of AWWA C600, latest revision, and as modified herein. Installation via open-cut excavation shall be accomplished in accordance with standard laying conditions.
 - (a) Ductile iron pipes shall be fully enclosed in polyethylene encasement and laid on a compacted sand cushion, 4" thick. Sand shall conform to fine aggregate MDOT Class II.
 - (b) Class II sand bedding material shall be placed around and above the pipe to a height of 12" above the pipe.
 - (c) Sand shall be compacted to 12" above the pipe to not less than 95 percent of the maximum unit density as determined at optimum moisture content.
 - ii. Other pipe materials and fittings approved for use by YCUA shall be installed in accordance with all applicable standards, manufacturer's recommendations, and as directed by YCUA.
 - iii. Water distribution and transmission mains shall be installed via open-cut excavation wherever possible. Other acceptable means of installation are

trenchless technologies such as horizontal directional drilling and pipe-bursting. Installations using other methods including, but not necessarily limited to, casing pipe construction and river crossings shall be completed as directed and/or approved by YCUA.

- iv. Tracer wire shall be placed along the top of the water main and taped in place with duct tape or electrical tape at maximum 6' intervals. All tracer wire shall be successfully tested for continuity. For ductile iron pipe, the tracer wire shall be placed outside the polyethylene encasement.
 - (1) Tracer wire shall be extended up the outside of each valve box, curb stop, hydrant, or other appurtenance of the main line through the use of a main line to service a three-way connector. The main line tracer wire shall remain along the pipe and not be cut or disturbed.
 - (2) Tracer wire on dead end water mains and at connections to existing mains that do not have tracer wire shall be terminated at a ground rod and use a main line service connector to bring up the branch side of the three-way outside the companion valve of the dead end hydrant and terminate by entering the valve box immediately downstream of the fire hydrant at the terminus of the water main.
- b. Joints and Joint Restraint
 - i. All joint materials shall be assembled in accordance with standard practice, the manufacturer's recommendations and as directed by YCUA.
 - ii. Restraints shall be applied to all joints that deflect pipe $11\frac{1}{4}^{\circ}$ or greater, including tees, hydrant shoes, reducers, plugs and caps. For push-on joints, approved restraints are required at the joint and in each direction at an adequate distance to resist the axial thrust of the test pressure. Where mechanical joints are approved by YCUA, proper restraints shall also be installed in each direction at an adequate distance in combination with approved mechanical restraints at the joint in conformance with the DIPRA schedule or the manufacturers recommended restraint distances.
 - iii. No concrete thrust blocks shall be installed in combination with approved restraints unless approved by YCUA. Thrust blocks, where allowed, shall be formed of 3,000 psi concrete and shall be installed against undisturbed earth.
- c. Valves, Wells and Boxes
 - i. Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure containing bolting and test plugs, cleanliness of valve ports and seating surfaces. All bolts and nuts, except for adjusting bolts or screws in butterfly valves, shall be checked for proper tightness. Seat adjusting bolts in butterfly valves shall be adjusted only as recommended by the manufacturer.
 - ii. Water main shall be placed level through all valve wells unless specified otherwise by YCUA.
 - iii. All flexible pipe to valve well connections shall be installed per manufacturers' specifications.
- d. Fire Hydrants

- i. Fire hydrants shall be installed in accordance with AWWA Manual M17. Each hydrant will be set plumb and braced firmly in this position. Connection of the hydrant to the branch will be made by means of mechanical joints, as herein specified under jointing. All joints between the hydrant and the main will be restrained by the same means as used for water main as specified in Item II.Construction Methods.5.b.
 - ii. If hydrants are furnished with drain outlets, the outlets must be permanently capped or plugged.
 - iii. After the hydrant has been set, an additional 1' depth of gravel shall be spread and tamped around the hydrant. When this has been done, the remaining backfill will be placed and compacted, taking care at all times to avoid jarring the hydrant.
 - iv. After hydrants have been installed and tested, the portion above ground shall be painted with 2 coats of Rustoleum OSHA "Safety Yellow."
- e. Cleaning and Testing

i. Cleaning

Prior to disinfection and hydrostatic testing, newly constructed water mains less than 24" in diameter shall be thoroughly flushed to remove all accumulated debris that may have entered the line during construction. Flushing shall include the use of a "polly pig" or approved equal, to remove accumulated deposits. The frequency of running the "polly pig" through the water mains shall be determined by the debris discharging from the effluent. Several passes with the "polly pig" through the newly constructed system may be required before the main is acceptable. Procedures for use of the "polly pig", or approved equal equipment, may be per the manufacturer's specifications. Mains 24" in diameter and larger shall be manually cleaned and inspected during installation.

ii. Testing

(a) Bacteriological

After flushing, the water mains shall be disinfected in accordance with AWWA C651, latest revision.

The proprietor shall furnish chlorine and all necessary labor and equipment for its application. The proprietor shall make suitable arrangements with YCUA for bacteriological analysis. The proprietor shall dispose of high residual chlorine water by a method approved by YCUA.

Water mains 24" in diameter and larger shall be chlorinated in sections between main line valves. Chlorine solution shall be renewed and transferred to the next adjacent section of pipe minimizing the volume of water needed to sterilize the main.

(b) Hydrostatic

Within a reasonable length of time following installation and backfilling, the proprietor shall complete all work necessary to perform hydrostatic testing.

The hydrostatic testing shall be conducted in accordance with AWWA C600, latest revision.

The proprietor shall perform all necessary preliminary hydrostatic tests and shall make all necessary repairs, including the repair of all visible leaks and cracks, and re-tests with his own forces to ready the water mains for final hydrostatic inspection and testing. Immediately after the water mains have passed such preliminary tests, the proprietor shall perform a final hydrostatic inspection and test.

The hydrostatic test shall be conducted before the new water main is connected to the existing water system, except as specified below. The proprietor shall furnish all necessary personnel, temporary blow-offs, plugs, bracing, test pumps and all other necessary apparatus for conducting the test. Testing shall be conducted under the observation of the YCUA or its designated representative.

At the option of YCUA, testing may be performed against closed, locked valves, providing that the new main has passed bacteria tests, to be tested and the testing apparatus shall have first been flushed and chlorinated in accordance with accepted procedure. After chlorination and subsequent flushing, a sample of water must show safe bacteriological results through a test by a recognized laboratory. In the event of an unsatisfactory hydrostatic test, the proprietor will cut the new main, install caps or plugs, pressure test and re-chlorinate.

Each hydrant assembly shall be tested. The test shall consist of flushing the hydrant for a minimum of 10 minutes. During the test period, the flanges of the hydrant will be hydrostatically tested at the system's pressure and the 6" gate valve shall be closed and opened. The proprietor shall provide all necessary equipment and labor for making the tests, including hoses for disposal of water. A testing schedule and method of disposing of flushing water shall be submitted to YCUA for approval. The testing schedule shall be coordinated with YCUA or its designated representative.

- f. Water Services
 - i. Water services $\frac{3}{4}$ " to 2" diameter shall be installed in accordance with manufacturers' recommendations. Water services larger than 2" diameter shall be installed in accordance with the requirements for water distribution mains.
 - ii. Water services from one side of a public roadway to the opposite side shall be installed in accordance with the requirements of the agency having jurisdiction over the right-of-way and as approved by YCUA.
- g. Corporation stops and saddle sleeves, where required, shall be installed in accordance with manufacturers' recommendations and as directed by YCUA. Corporation stops will be tested for proper operation by YCUA or its designated representative prior to backfilling.

- h. Curb stops and boxes shall be installed in accordance with manufacturers' recommendations and as directed by YCUA. Curb stops will be checked for accessibility and proper operation by YCUA or its designated representative prior to installation of a meter. Unless otherwise authorized, only YCUA staff shall operate curb stops.
- i. Meters
 - i. Unless otherwise authorized by YCUA, domestic and fire suppression meters up to 1½" diameter will be installed by YCUA personnel.
 - ii. Meters larger than 1½" diameter shall be installed by the proprietor and inspected and approved by YCUA or its designated representative. Master meters will not be provided by YCUA. Master meters shall be tested and calibrated in accordance with applicable AWWA standards and manufacturers' recommendations.
- j. Backflow prevention devices shall be installed in accordance with applicable AWWA standards and manufacturers' recommendations. Backflow prevention devices shall be tested by a state certified tester and a written copy of the certification generated during the test shall be submitted to YCUA.
- k. Corrosion Control
 - i. Polyethylene encasement shall be installed as specified in AWWA C105 (ANSI 21.5), latest revision. V-Bio Additive is a new standard recommended by DIPRA.
 - ii. Additional corrosion control measures, if necessary, shall be installed in accordance with the recommendation of DIPRA and/or the manufacturer.
- l. Other water supply system infrastructure including, but not necessarily limited to, pressure reducing valves, storage facilities, and booster pumps stations, shall be installed in accordance with all applicable AWWA standards, manufacturers' recommendations, and as directed by YCUA.

V. WASTEWATER SYSTEM

General

1. Wastewater system improvements shall be designed and constructed in accordance with the requirements of Part 41 of Act 451 of the Public Acts of 1994, as amended, the most recent revision of the Recommended Standards for Sewage Works by the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers (commonly known as the "Ten States Standards") and as prescribed herein.
2. All wastewater system improvements will require the review and approval of the Ypsilanti Community Utilities Authority (YCUA). Proposed public wastewater system improvements will require the review and approval of YCUA and the Michigan Department of Environment, Great Lakes, and Energy (EGLE). Wastewater facilities are typically considered public facilities when two or more service connections are made to the same sanitary sewer. In most instances, including multiple unit developments, the sanitary sewer may have to be public even though the project has one owner. YCUA approval will be required for private sanitary sewers serving more than one residence or building. The extension of sanitary sewers will generally be required across the entire frontage of the site.
3. Wastewater system improvements specified in the latest revision of the YCUA Sanitary Sewer Master Plan may be required as part of the project. The applicant shall contact YCUA to determine if any improvements identified in the latest revision of the YCUA Sanitary Sewer Master Plan will need to be incorporated as part of the project.
4. Plan and profile views shall be provided for all proposed wastewater system improvements including force mains. The plan and profile shall be presented on the same plan sheet and shall be vertically oriented.
 - a. Wastewater design calculations, the wastewater district map and a wastewater system quantity list shall be provided on the cover sheet of the detailed engineering plans. The design calculations and wastewater district map shall include both current and future service areas and populations. The wastewater system quantity list shall be delineated by existing or proposed road right-of-way or easement.
 - b. The following information must be shown in the plan view of proposed wastewater system improvements:
 - i. Size, material and type of pipe.
 - ii. Length between structures (and/or appurtenances for pressure sanitary sewers).
 - iii. Slope of pipe between structures (and/or appurtenances for pressure sanitary sewers).
 - iv. Where required, a dedicated sanitary sewer easement must be shown on the plans. The sanitary sewer easement width shall be either twice the depth of

- the pipe plus the diameter of the pipe plus 2' (rounded up to the nearest whole foot), or 25', whichever is greater.
- v. Top of casting and all pipe invert elevations with direction identified at each structure (and/or appurtenances for pressure sanitary sewers).
 - vi. Progressive numbering system for structures and appurtenances.
- c. The following information must be shown in the profile view of proposed wastewater system improvements:
- i. Existing and proposed ground elevations.
 - ii. Length, type, class, size and slope of pipe between structures (and/or appurtenances for pressure sanitary sewers).
 - iii. Top of casting and all pipe inverts with direction identified at all structures;
 - iv. All utility crossings.
 - v. Special backfill areas, i.e. sand.
 - vi. Provisions for infiltration testing.
 - vii. Progressive numbering system on structures.
 - viii. Adjacent existing or proposed utilities plotted where parallel.
- d. Plans showing any proposed wastewater system improvements, public and/or private, shall be accompanied by the YCUA standard wastewater detail sheets. The standard details are included in the Digital Appendix.
5. Connection of individual residences or buildings to the wastewater collection system will require the submittal of a utility service plan for review and approval by YCUA. Utility services plans can be submitted on 8½" x 11" white paper with blue or black lines. The following information must be shown on the utility service plan:
- a. The applicant's name, address, telephone number, and electronic mail address (if available).
 - b. The name, address, telephone and fax numbers, and electronic mail address for the applicant's engineer/surveyor.
 - c. The utility service plan shall be prepared to a scale of 1" = 40'. The following items must be shown on the utility service plan:
 - i. A legal description of the parcel, including tax identification number, along with a sketch showing all property lines including the bearing and distance.
 - ii. All sides of the proposed or existing building.
 - iii. Existing and/or proposed driveways and sidewalks, including materials and thicknesses.
 - iv. Existing and/or proposed utilities on the parcel or in the adjacent public right-of-way or easement. Utilities to be shown include, but may not necessarily be

limited to: water supply, wastewater, storm sewer, gas, telephone, electric, and cable television.

- v. Existing and/or proposed building sewers, water services, and storm sewer laterals (for sump pump discharges, if applicable). Information shall include proposed material and size. Dimension all pipes and any cleanouts from the building corners.
6. Trunk line and transmission charges, benefit charges, as well as tap fees and meter fees associated may apply to water supply system improvements and/or connections to the existing water supply system. The schedules for these fees can be found on the YCUA website.
 7. Projects involving non-residential discharges to the YCUA wastewater collection system may be required to be designed, constructed and operated in accordance with the Industrial Pretreatment Program as identified in the YCUA Sewer Use Ordinances, latest revision.

Design Criteria

1. Capacity Design

- a. For design purposes, population in the tributary area shall be based on a minimum of 3½ persons per single family residence, also referred to as an equivalent residential unit (ERU). The basis of design calculations shall include a tabulation of the proposed usage types and the conversion of the various uses into ERUs. The adopted unit factors as included in the YCUA Trunkline and Transmission Line Service Charge ordinance shall be used to convert different usage types to ERUs.
- b. Wastewater collection systems shall be designed on the basis of an average daily flow of 100 gallons per capita per day. The required capacity shall be determined by the peak design flow using the peaking factor as prescribed by the Ten States Standards.
- c. All gravity sanitary sewers shall be designed to provide average velocities, when flowing full, of not less than 2 feet per second, based on Manning's formula using an "n" value of 0.013. The maximum design velocity for gravity sanitary sewers shall be 10 feet per second with the pipe flowing full.
- d. The minimum size for gravity sanitary sewers shall be as follows:
 - i. For proposed systems discharging to existing gravity sanitary sewers 10" diameter or larger, the minimum size pipe shall be 10" diameter, with the terminal section of 10" diameter gravity sanitary sewer at a uniform slope of not less than 1.0% between structures. The minimum slope for all other sections of 10" diameter gravity sanitary sewer shall be 0.3% between structures.
 - ii. For proposed systems discharging to existing 8" diameter gravity sanitary sewers, the proposed pipe shall be 8" diameter, with the terminal section of 8"

diameter gravity sanitary sewer installed at a uniform grade of not less than 1.0% between structures. The minimum slope for all other sections of 8" diameter gravity sanitary sewer shall be 0.4% between structures.

- iii. No proposed discharges, including connection of building sewers, to existing sanitary sewers smaller than 8" diameter will be allowed.
- iv. Gravity sanitary sewer pipes smaller than 8" diameter are considered building sewers and no more than one service connection will be allowed through pipes smaller than 8" diameter.
- e. Non-residential discharges to the YCUA wastewater system may need to incorporate such measures including, but not necessarily limited to, grease separators and/or oil separators. The need for such measures and design thereof shall be subject to the review and approval of YCUA.

2. Sanitary Sewer Location

- a. Sanitary sewers shall be located to provide unrestricted access for inspection and maintenance operations. Wherever possible, sanitary sewers and appurtenances shall be located outside the influence of existing or proposed pavement. Within existing or proposed public road rights-of-way, sanitary sewer alignments and appurtenance locations should be in accordance with the requirements of the agency having jurisdiction. Alignments and locations within private road easements should be in accordance with the requirements of the agency having jurisdiction over the adjacent public road right-of-way. Sanitary sewer alignments and appurtenance locations in easements outside of public road rights-of-way will be evaluated individually.
- b. A minimum horizontal separation of 10' shall be provided between sanitary sewers and water mains. Adequate horizontal separation shall be provided between sanitary sewers and all other underground utilities to allow a 1:1 trench slope from the bottom of the deeper utility such that the shallower utility will not be undermined. If it is impossible to obtain proper horizontal and vertical separation as described above, both the water main and sanitary sewer must be constructed of push-on or mechanical joint pipe complying with the requirements outlined in Chapter II, Water Supply System. A variance will be required from both YCUA and EGLE for any proposed sanitary sewer improvements that will not satisfy the minimum horizontal separation requirements.
- c. Where sanitary sewer alignments cross alignments of other utilities, the angle between horizontal alignments at the crossing shall not be less than 45°.

3. Depth of Sewers

- a. The minimum depth of cover over the top of gravity sanitary sewer pipe shall be 4' as measured from the proposed ground elevation.
- b. Gravity sanitary sewers shall be a minimum of 10' deep when fronting residential parcels to be directly connected to the sewer. Deep setbacks or unusual topographic conditions may require more depth.

- c. A minimum vertical separation of 18" shall be provided between sanitary sewers and water mains. In addition, a minimum vertical separation of 12" shall be provided between sanitary sewers and other underground utilities unless otherwise approved by YCUA and/or the agency having jurisdiction over the other utility.
- d. The maximum depth to invert of any sanitary sewer shall not exceed the depth recommended by the pipe manufacturer for each size and class of pipe. The applicant's design engineer shall provide the manufacturer's installation instructions/recommendations with the plan submittal for review by YCUA.

4. Manholes

- a. Manholes shall be installed at intervals not to exceed 300', or at the following locations:
 - i. The upstream terminus of a gravity sanitary sewer run, including transition between a gravity building sewer and a low-pressure sanitary sewer pipe. Wherever possible, dead-end gravity sanitary sewer alignments shall be avoided. Gravity sanitary sewer alignments shall be extended to common terminus locations and high-point manholes shall be installed at the common terminus locations.
 - ii. All changes in pipe grade.
 - iii. All changes in pipe size.
 - iv. All changes in horizontal alignment.
 - v. All gravity sanitary sewer junctions.
 - vi. Monitoring locations as identified in the YCUA Sewer Use Ordinance, latest revision.
- b. Manholes shall be located such that the casting will not be in street or parking lot pavements, sidewalks or driveways.
- c. Manholes for sanitary sewers 21" diameter and smaller shall have a minimum inside diameter of 48". Manholes for sanitary sewers larger than 21" diameter shall have a minimum inside diameter of 60". Larger diameter manholes may be required depending on such factors as the number of sanitary sewers at a junction or significant changes in horizontal alignment. Manholes for transitions between gravity building sewers and low-pressure sanitary sewer pipe shall have a minimum inside diameter of 24".
- d. Internal drop connections will be required where the invert of the outlet gravity sanitary sewer is 18" or more below the inlet pipe invert.
- e. The 0.8 depth flow line of gravity sanitary sewers shall be matched at structures when changing sizes of gravity sanitary sewers.

- f. An allowance of 0.1' in grade shall be made for loss of head through a manhole where gravity sanitary sewer horizontal alignment is deflected 30° or more.

5. Building Sewers

a. General

- i. Except as permitted by the YCUA Sewer Use Ordinances, each individual residence or building connected to the YCUA wastewater collection system shall have an independent building sewer.
 - ii. For each parcel along the route of a proposed gravity sanitary sewer, a building sewer shall be constructed from the gravity sanitary sewer to the public right-of-way or easement line. In particular, this applies to any parcels in the sanitary sewer service design area that are zoned for no more than one single-family residence or parcels that have an existing residence or building when the gravity sanitary sewer is installed. Installation of building sewers may not be required to larger vacant parcels that may be developed in the future.
- b. Building sewers shall be aligned such that the building sewer pipe is perpendicular to the centerline of the public road right-of-way or easement.
 - c. Building sewers may be connected directly to an existing manhole when the manhole is located in the right-of-way or easement between the extension of the side property lines of the parcel. Internal drop connections, as specified elsewhere, may be required.
 - d. The minimum grade for building sewers shall be 1% for 6" diameter pipe and 2% for 4" diameter pipe.
 - e. Connections other than sanitary building sewers will not be permitted. Downspouts, weep tile, footing drains, sump pump discharges or any other conduit that collects storm or ground water shall not be discharged into the building sewer.
 - f. Private building sewers of excessive length, although not a public sewer, may require inspection and testing. Each site will be considered individually by YCUA.
 - g. Cleanouts shall be provided within 5' of foundation walls, at all bends and at intervals not greater than 90', and at the location where the building sewer enters the public road right-of-way or the sanitary sewer easement.
 - h. Threaded cap cleanouts shall be installed in a minimum of 8" tall monument box with a minimum 8" internal diameter and sewer marked on the lid (EJ 1566 or an Engineer approved equal). Clean out monument boxes shall be set on a minimum of 6" compacted, well-graded stone.
 - i. The minimum allowable horizontal separations between building sewers and other facilities are as follows:
 - i. Water services – 3'.

- ii. All other utilities and structures – 10’.

6. Inverted Siphons

- a. In general, sanitary sewer siphons will only be accepted where no other feasible alternative exists and where there will be sufficient flow in the sewer so that maintenance will be held to a minimum.
- b. The minimum pipe size for inverted siphons shall be 6” diameter.
- c. A minimum of two pipes shall be provided for each inverted siphon. Inverted siphons shall be designed to have a minimum velocity of three feet per second. Design calculations including plan and profile drawings shall be submitted for review and approval by YCUA.

7. Pump/Lift Stations

- a. Pump stations and pressure sanitary sewers will only be allowed when no practical gravity sanitary sewer alternative exists.
- b. A minimum of two pumps shall be provided. Pump stations shall be designed to pump the anticipated peak hour flow with the largest pump out of service.
- c. Pump stations shall be protected from physical damage during a 100-year flood and remain operable and accessible during a 25-year flood.
- d. Pump station structures and equipment shall be protected from vehicular traffic. Provisions for maintenance vehicles shall be provided, including pavement with sufficient space to park and maneuver as well as a curb cut to allow ingress/egress from the adjacent roadway.
- e. Sketches of the typical pump station layout and sections, including some of the standard equipment requirements, are provided in the Digital Appendix. Pump stations must include valves and risers to accommodate bypass of the station under various conditions and drainage from the valve vault to the wet well.
- f. Electrical, instrumentation and control devices, including adequate alarms and backup power, will be required.
- g. Wastewater pumps shall meet the following requirements:
 - i. Pumps must be capable of passing 3” or larger spheres.
 - ii. Pump suction and discharge opening must be at least 4” diameter.
 - iii. Pumps shall operate under a positive suction head.
 - iv. Pump “off” level shall be above the pump impeller.
 - v. Pumps must be equipped with individual intakes.
 - vi. Pump motors shall be three-phase electric.
 - vii. Shut off valves shall be provided on the discharge line of each pump.

viii. Check valves shall be provided between the pump discharge and the shut off valve on the discharge line.

8. Pressure Sanitary Sewers

- a. Pressure sanitary sewer pipe shall have a minimum diameter of 4". Low pressure sanitary sewer pipe may require a smaller pipe to prevent solids and H₂S build-up and damage to the system.
- b. Pressure sanitary sewers shall be designed to maintain a minimum velocity of 2 feet per second.
- c. Valves and appurtenances shall be provided in the following locations:
 - i. Isolation valves shall be provided per the spacing requirements as specified in the Water Supply System chapter of these standards.
 - ii. Air/vacuum relief valves shall be provided at all high points.
 - iii. Clean outs shall be provided at all low points.
- d. Pressure sanitary sewers shall be designed to discharge to gravity sanitary sewers at manholes. The pressure sanitary sewer shall enter the receiving manhole at a point no less than 6" above the invert of the outlet gravity sanitary sewer invert and no more than 2' above the flow line in the gravity sanitary sewer.
- e. Pressure sanitary sewer pipe shall be designed to withstand both internal pressures and external trench as well as live loads. Design computations shall be submitted by the applicant's design engineer for review and approval by YCUA.
- f. Low pressure sanitary sewer systems which utilize individual grinder pump stations at each separate user will not be accepted as part of the YCUA wastewater collection system. Such systems, if deemed appropriate by YCUA, will be private with operation and maintenance of both the grinder pump station and low-pressure sanitary sewer pipe remaining the responsibility of the applicant or property owner.

9. On-site sewage disposal will be allowed in locations where public gravity sanitary sewer is not available. A copy of a valid on-site sewage disposal system permit from the Washtenaw County Environmental Health Division must be submitted prior to plan approval.

Materials

1. Sanitary Sewer Pipe

- a. Gravity sanitary sewer pipe shall be one of the following:
 - i. For pipes 4" diameter to 15" diameter, solid wall polyvinyl chloride (PVC) conforming to the requirements of ASTM D3034, latest revision. Solid wall PVC pipe shall have a sidewall dimension ratio (SDR) no greater than 26.
 - ii. Extra strength clay pipe conforming to the requirements of ASTM C700, latest revision.
 - iii. Reinforced concrete pipe and inverted siphons conforming to the requirements of ASTM C76, latest revision.
- b. Pressure sanitary sewer pipe shall be one of the following:
 - i. Ductile iron conforming to the material requirements prescribed in item II.Materials.1., Water Supply System, Materials, Water Transmission and Distribution Mains.
 - ii. Solid wall PVC conforming to the requirements of ASTM D3034, latest revision, with an SDR no greater than 21.
- c. If other materials are proposed for use, the applicant shall furnish the necessary design data for the proposed depth and operating conditions. Use of materials other than those specified herein will not be allowed unless approved by YCUA.

2. Pipe Joints

- a. Pipe joints for gravity sanitary sewer shall conform to the following requirements depending on the type of pipe used:
 - i. Joints for solid wall PVC pipe shall be push-on type unless solvent weld joints are approved by YCUA. Push-on type joints shall conform to ASTM D3212, latest revision. Solvent weld joints, where approved by YCUA, shall conform to ASTM D2855, latest revision.
 - ii. Bell and spigot joints on extra strength clay pipe shall be in accordance with requirements of ASTM C425.
 - iii. Modified grooved tongue joints for reinforced concrete pipe shall have a rubber gasket snapped into a groove cast in to the tongue. Rubber gasket joints for reinforced concrete pipe shall be in accordance with ASTM C443, latest revision.
- b. Joints and fittings for pressure sanitary sewer pipe shall be equal to the YCUA requirements for pressure pipe as specified in Chapter II, Water Supply System.

3. Manholes and Vaults

- a. Manholes and vaults shall be constructed of precast reinforced concrete sections, unless otherwise approved by YCUA.
- b. Precast reinforced concrete manhole sections shall conform to requirements of ASTM C478, latest revision.
- c. Precast manhole joints shall be modified grooved tongue with rubber gasket joints as described in item III. Materials.2., Wastewater System, Materials, Joints.
- d. Manhole steps, where required by YCUA, shall be reinforced polypropylene plastic, PS2-PFS, manufactured by M.A. Industries, Inc., or approved equal.
- e. Cover and frame for new manholes shall be East Jordan Iron Works #1040Z with Type "AGS" cover or approved equal. Covers shall be cast with the words "SANITARY SEWER" in raised letters spaced in from the periphery of the cover. New cover and frame for existing manholes (gasketed, no bolts, recessed pick holes) shall match the existing cover and frame.
- f. All new sanitary manholes shall have an infiltration fabric placed from the top of the frame casting base over the adjustment rings and over at least half of the transition cone section of the manhole chimney. The material shall be Infra-Shield, Canusa Wrap, WrapidSeal, or approved equal. Existing sanitary manholes located within the limits of a project that have the cone section excavated shall have the infiltration fabric installed. Existing manholes that are not excavated shall have the chimney coated internally with a product approved by YCUA.
- g. Rings for grade adjustment of covers and frames shall be injection molded high density polyethylene adjustment rings as manufactured by Ladtech, Inc., or approved equal. Use of other materials, such as precast concrete rings or concrete brick and mortar, will not be allowed unless otherwise approved by YCUA.
- h. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.
- i. Each adjustment ring shall be sealed with a 3/16" to 1/4" bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet ASTM C-990, latest revision.
- j. All castings and adjustment rings shall be securely fastened to the cone of the structure with four 3/8" threaded rods. The rods shall be galvanized or stainless steel anchored to the structure with Redhead concrete anchors or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.
- k. Manhole Drops

- i. Manhole drop connections shall be interior drops using the drop bowl as produced by Reliner-Duran Inc. or approved equal.
- ii. Drop bowl model "A-4" shall be used for all lines up through full 6" inlets. Drop bowl model "A-6" shall be used for all 8" inlets. Drop bowl model "B-8" shall be used for all 10" inlets. Lines larger than 10" shall be as directed by YCUA.
- iii. The force line hood shall be attached on models "A-4" and "A-6" when the incoming line is from a force main or the slope of the incoming gravity sanitary sewer is 3% or greater.
- iv. The drop pipe shall be secured to the manhole wall with Reliner-Duran, Inc. stainless steel adjustable clamping brackets or approved equal.
- v. The drop will face the flow downstream and have a custom built concrete bench that directs the flow into the channel.

4. Building Sewers

- a. Building sewers shall be constructed of solid wall PVC pipe conforming to ASTM D2751, latest revision, minimum schedule 40 or solid wall PVC conforming to the requirements of ASTM D3034, latest revision, with an SDR no greater than 26.
- b. Building sewers larger than 6" diameter shall be constructed of materials permitted for gravity sanitary sewers under the same conditions of depth.
- c. Joints in building sewers, including fittings, shall be solvent welded conforming to the requirements of item III. Materials.2.a.i., Wastewater System, Materials, Pipe Joints.
- d. Cleanouts, including bends, wye fittings, and caps shall be the same material as the building sewer. Caps shall be secured to the riser section of the cleanout via a threaded connection.
- e. Connection of new building sewers to existing gravity sanitary sewers shall be accomplished using a service saddle. Service saddles shall be a flexible tap saddle in tee configuration as manufactured by Fernco, Inc. or approved equal.

5. Pump Stations and Pressure Sanitary Sewers

- a. Unless otherwise approved by YCUA, pumps shall be submersible type. Pumps shall be manufactured by ITT Flygt or approved equal.
- b. Isolation valves on pressure sanitary sewers shall be plug valves.
 - i. Plug valves shall be non-lubricated, eccentric type with nitrile butadiene (hycar) or Buna-N resilient faced plugs. End connections shall generally be flanged or grooved for inside valves and mechanical joint for exterior ground-buried valves. Port area shall be equal to at least 80% of the nominal size pipe area. Valve bodies shall be suitably marked to indicate whether the valve is open or closed.
 - ii. The seating surface of the valve body shall be welded in stainless steel or nickel. Bearings at the top and bottom supporting the rotating element shall

be self-lubricating, corrosion-resistant type, suitable for sewage plant service. The valve shall be of the bolted bonnet design. Packing shall be adjustable and replaceable without disassembling of the valve. The valve body shall be cast or ductile iron marked to show seat side of valve. A grit seal shall be provided for the bottom of the valve shaft.

- iii. Plug valves shall be of adequate design to operate with a pressure of 50 psi on both sides or on either side of the valve without leakage.
6. On-site sewage disposal systems shall be constructed using materials approved by the Washtenaw County Environmental Health Division.

Construction Methods

1. General

a. Excavation

- i. Excavation, bedding, and backfill operations shall be accomplished in accordance with requirements outlined in Chapter VI, Grading and Earthwork, except as modified herein.
- ii. Pipes shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 3" for 24" diameter and smaller pipe and not less than 4" for pipe larger than 24" diameter. Concrete encasement or concrete cradle shall be used as directed by YCUA.
- iii. PVC pipe shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 4" conforming to Class B bedding as shown on the plans. Where shown on the plans, or where the pipe passes under a road with less than 4' of cover, the pipes shall be encased.
- iv. For all pipes, compacted granular material shall be placed at the sides of the pipe and cover not less than 12" above the crown of the pipe.
- v. "Granular Material" shall be Class II sand, pea gravel, or crushed stone conforming to ASTM C33 Size No. 67. Class II sand must be placed in no more than 6" layers and compacted to not less than 95% standard density for PVC and 90% standard density for reinforced concrete. Open graded stone is 100% upon placement and shucking into the haunch zone of the pipe.
- vi. Pea gravel or crushed stone used for bedding shall be separated from the sand backfill with a non-woven geotextile fabric. The fabric shall be Amoco 4551, or approved equal.

b. Existing Wastewater System

- i. Wastewater system improvements shall be constructed without interruption of service in the existing system. Temporary provisions to maintain service, such as bypass pumping, shall be the responsibility of the proprietor unless otherwise approved by YCUA.

- ii. The condition of the existing wastewater system will be observed by YCUA prior to the commencement of any improvements to the existing system or adjacent to the existing system. Any damage or adverse impact to the existing wastewater system resulting from the operations or actions of the proprietor or their designated representative shall be remedied by the proprietor. Damage or adverse impacts include, but are not necessarily limited to, introduction of debris to the system and improper adjustment of manhole castings.

2. Submittals

a. Certifications

All pipe, fittings, and appurtenances delivered to the job shall be accompanied by certification papers showing that the materials have been manufactured and tested in accordance with all applicable standards.

b. Shop Drawings

Shop drawings may be required for certain materials including, but not necessarily limited to, pump stations and appurtenances prior to fabrication and manufacture.

3. Delivery, Handling and Storage

- a. Wastewater system materials shall be delivered, handled, and stored in accordance with the manufacturer's recommendations and as specified by YCUA.

- b. Upon delivery to the project site all materials will be inspected by YCUA or its designated representative. Rejected materials shall be immediately removed from the project site by the proprietor.

4. Construction Sequence

Unless otherwise authorized by YCUA, construction of wastewater system improvements shall begin at the downstream end of the system and proceed upstream.

5. Installation

a. Sanitary Sewer Pipe

i. General

- (1) All pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress shall be kept dry; and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with holes at each joint to receive bells. All pipe shall be laid with bells uphill.
- (2) The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by levels, laser or other tools which shall be furnished by the proprietor. Each pipe shall be

laid accurately to the line and grade as shown on the Plans and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sanitary sewer pipe shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials. Bulkheads shall be used to keep foreign materials out of the open end of the sanitary sewer pipe when work is not in progress.

- (3) All pipe and fittings shall be carefully lowered and moved into position in the trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining. An excessive amount of scratching on the surface of the PVC pipe will be considered cause for rejection.
 - (4) The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by YCUA, the backfilling shall follow and be completed to the top of the trench within two pipe lengths behind pipe laying.
 - (5) All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine tooth saw, tubing cutter or similar tool may be used to cut PVC pipe. Cuts must be square. Ragged edges shall be removed with a cutting tool or file.
 - (6) After cutting bell and spigot or socket pipe, a stop mark shall be made with a pencil or crayon using dimensions as shown by the manufacturer's instructions or by using another pipe in the field as a guide.
 - (7) Breaks in pipe or joints shall be repaired by the proprietor to the satisfaction of YCUA.
- ii. Gravity Sanitary Sewer
- (1) Solid wall PVC pipe, shall be installed in accordance with the requirements of ASTM D2321, latest revision.
 - (2) Extra strength clay pipe shall be installed in accordance with the requirements of ASTM C12, latest revision.
 - (3) Reinforced concrete pipe shall be installed in accordance with the requirements of ASTM C76, latest revision.
- iii. Pressure Sanitary Sewer
- (1) Ductile iron pipe and appurtenances shall be installed as prescribed in item II. Construction Methods.5.a., Water Supply System, Construction Methods, Water Transmission and Distribution Mains. Ductile iron pipe shall have SewerSafe, ProtectO, or other coating as approved by the Engineer.
 - (2) Plastic pressure sanitary sewer pipe shall be installed in accordance with the requirements of ASTM D2274, latest revision.

All joints shall be made-up in accordance with the manufacturer's instructions using materials and equipment especially prepared for the type of joint to be used.

- b. Manholes and Vaults
 - i. Precast base section shall be placed on a well-graded granular bedding course conforming to requirements for sewer bedding, but not less than 6" in thickness and extending to the limits of the excavation. The bedding course shall be firmly tamped and made smooth and level to ensure uniform contact and support of the precast element.
 - ii. Manhole and Vault Sections
 - (1) All lift holes and all joints between precast elements in manholes shall be thoroughly wetted and then completely filled with mortar and smoothed to ensure watertightness. The outside of manhole joints shall be sealed with infiltration wrap.
 - (2) Precast sections shall be placed and aligned to provide vertical sides and vertical alignment of the manhole steps if required by YCUA. The complete manhole shall be rigid, true to dimensions, and watertight.
 - (3) Epoxy joints of polymer concrete manholes shall be inspected for damage and cleaned of all debris. Apply compatible epoxy material for bonding in accordance with manufacturer's instructions.
 - iii. Placing of Castings, Grade Rings, and Top Sections
 - (1) Castings placed on concrete surface shall be set in full mortar beds. The mortar shall be mixed in proportion of 1 part Portland cement to 2 parts sand, by volume, based on dry materials. Castings shall be set accurately to the finished elevation so that no subsequent adjustment will be necessary unless otherwise specified by YCUA.
 - (2) Where castings are located in paved surfaces or areas which have been brought to grade, not more than 15" shall be provided between the top of the cone or slab and the underside of the casting for adjustment of the casting to street grade. A minimum of 6" of adjustment shall be provided at each manhole.
 - (3) Where castings are located in unpaved traffic bearing areas, provide not more than 12" of adjusting rings between the top of the cone or slab and the underside of the casting for adjustment of the casting to finished grade. Set the top of the casting 5" below finished grade, unless otherwise directed by YCUA.
 - (4) Where castings are located in cultivated agricultural areas, the top of the manhole casting shall be set at least 6" higher than the finished grade, and in noncultivated areas, set the casting flush with the finished grade, unless otherwise directed by YCUA.
 - (5) Point up and make watertight adjusting rings used to set the casting to grade. Infiltration wrap shall cover the adjustment from 6" down on the cone to at least 4" from the lip of the frame.
 - (6) All channels shall be constructed to the full flow depth of the pipe.

c. Pumps and Appurtenances

Pumps and appurtenances, as well as other wastewater system infrastructure, shall be installed in accordance with all applicable ASTM standards, manufacturers recommendations, and as directed by YCUA.

d. Pressure Sanitary Sewer

Pressure sanitary sewer shall be tested in accordance with the requirement for hydrostatic testing as prescribed for water supply system improvement in Chapter IV.

6. Testing

a. General

All sanitary sewers shall be subjected to infiltration, exfiltration or low pressure air tests, or a combination thereof prior to final acceptance by YCUA. In addition, all PVC and ABS plastic sewers shall be subjected to deflection testing by means of a nine-point deflection test mandrel.

YCUA or its designated representative shall be present for all testing operations. If testing is to be done by the proprietor, only properly trained personnel shall be allowed to perform the testing work. If testing is to be done by municipal agency work forces, then the proprietor shall be responsible for coordinating with the inspector in order to schedule the testing.

In the event that the sanitary sewer pipe fails any of the required tests, the proprietor shall be responsible for repairing the pipe and repeating the test until acceptable results are achieved.

The method of testing and measurement shall be approved by YCUA. The proprietor shall provide all necessary equipment and labor for making the tests.

b. Infiltration Test

All sanitary sewers that are over 24" diameter shall be subjected to an infiltration test. Also, all sanitary sewers that are 24" diameter and smaller and where the ground water level is more than 7' above the top of the sewer shall be subjected to an infiltration test.

The infiltration rate for all sanitary sewers shall not exceed a maximum of 200 gal./in. diameter per mile of sewer per 24 hours.

c. Low Pressure Air Test

All sanitary sewers that are 24" diameter or smaller and where the ground water level is 7' or less above the top of the sewer shall be subjected to a low pressure air test.

Sight tubes are not permitted in the YCUA sanitary sewer system. Groundwater in the sanitary trench, for purposes of air testing, shall be measured by a piezometer tube located outside and adjacent to each manhole. The piezometer tube shall have a screened or slotted end, be backfilled with one cubic foot of

open graded aggregate at the end, and open at atmosphere between two (2) and three (3) feet above grade. The open graded aggregate around the end of the Piezometer shall be hydraulically connected to the sewer trench's open aggregate bedding and backfill. Upon substantial completion and acceptance of the sewer for use, the piezometer tube shall be removed or grouted, and abandoned at least three feet below grade.

The procedure for air testing of sanitary sewers shall be as follows:

The sanitary sewer line shall be tested in increments between manholes. The line shall be cleaned and plugged at each manhole. Such plugs shall be designed to hold against the test pressure and shall provide an airtight seal. One of the plugs shall have an orifice through which air can be introduced into the sewer. An air supply line shall be connected to the orifice. The supply line shall be fitted with suitable control valves and a pressure gauge for continually measuring the air pressure in the sewer. The pressure gauge shall have a minimum diameter of 3½" and a range of 0 – 10 psig. The gauge shall have minimum divisions of 0-10 psig and accuracy of plus or minus (+/-) 0.04 psig.

The sanitary sewer shall be pressurized to 4 psig greater than the greatest back pressure caused by ground water over the top of the sanitary sewer pipe. At least 2 minutes shall be allowed for the air pressure to stabilize between 3½ and 4 psig. If necessary, air shall be added to the sewer to maintain a pressure of 3½ psig or greater.

After the stabilization period, the air supply control valve shall be closed so that no more air will enter the sanitary sewer. The sanitary sewer air pressure shall be noted and timing for the test begun. The test shall not begin if the air pressure is less than 3½ psig, or such other pressure as is necessary to compensate for ground water level.

The time required for the air pressure to decrease 1.0 psig during the test shall not be less than the time shown in the following Air Test Tables. The proprietor shall use the appropriate test table based upon the sanitary sewer pipe material.

Table SA-1
Air Test Table for Vitrified Clay and Concrete Pipe

Specification Time (min:sec) Required for Pressure Drop from 3-1/2 to 2-1/2 PSIG When Testing One Pipe Diameter Only Pipe Diameter, Inches																
		4	6	8	10	12	15	18	21	24	27	30	33	36	39	42
Length of Line, Feet	25	0:04	0:10	0:18	0:22	0:27	0:32	0:36	0:45	0:54	1:03	1:12	1:21	1:30	1:39	1:50
	50	0:09	0:21	0:36	0:45	0:54	1:03	1:12	1:30	1:48	2:06	2:24	2:42	3:00	3:18	3:39
	75	0:14	0:32	0:54	1:08	1:21	1:34	1:48	2:15	2:42	3:09	3:36	4:03	4:30	4:57	5:29
	100	0:18	0:42	1:12	1:30	1:48	2:06	2:24	3:00	3:36	4:12	4:48	5:24	6:00	6:36	7:18
	125	0:22	0:52	1:30	1:52	2:15	2:38	3:00	3:45	4:30	5:15	6:00	6:45	7:30	8:15	9:08
	150	0:27	1:03	1:48	2:15	2:42	3:09	3:36	4:30	5:24	6:18	7:12	8:06	9:00	9:54	10:57
	175	0:32	1:14	2:06	2:38	3:09	3:40	4:12	5:15	6:18	7:21	8:24	9:27	10:30	11:33	12:47
	200	0:36	1:24	2:24	3:00	3:36	4:12	4:48	6:00	7:12	8:24	9:36	10:48	12:00	13:12	14:36
	225	0:40	1:34	2:42	3:22	4:03	4:44	5:24	6:45	8:06	9:27	10:48	12:09	13:30	14:51	16:26
	250	0:45	1:45	3:00	3:45	4:30	5:15	6:00	7:30	9:00	10:30	12:00	13:30	15:00	16:30	18:16
	275	0:50	1:56	3:18	4:08	4:57	5:46	6:36	8:15	9:54	11:33	13:12	14:51	16:30	18:09	20:06
	300	0:54	2:06	3:36	4:30	5:24	6:18	7:12	9:00	10:48	12:36	14:24	16:12	18:00	19:48	21:54
	350	1:03	2:27	4:12	5:15	6:18	7:21	8:24	10:30	12:36	14:42	16:48	18:54	21:00	23:06	25:33
	400	1:12	2:48	4:48	6:00	7:12	8:24	9:36	12:00	14:24	16:48	19:12	21:36	24:00	26:24	29:12
	450	1:21	3:09	5:24	6:45	8:06	9:27	10:48	13:30	16:12	18:54	21:36	24:18	27:00	29:42	32:51
	500	1:30	3:30	6:00	7:30	9:00	10:30	12:00	15:00	18:00	21:00	24:00	27:00	30:00	33:00	36:30

Note: Table SA-1 is taken from the National Clay Pipe Institute (NCPI) tables which are based upon ASTM C828 "Test Method for Low Pressure Air Test for Vitrified Clay Pipe Lines" and ASTM C924 "Standard Practice for Testing Concrete Pipe Sewer Lines by Low Pressure Air Test Method."

Table SA-2
Air Test Table for PVC and ABS Pipe
Minimum Specified Time Required for a 1.0 PSIG Pressure Drop
For Size and Length of Pipe Indicated for Q=0.0015 *

Pipe Dia. (in)	Minimum Time, (min:sec)	Length for Minimum Time, ft.	Time for Longer Length, seconds	Specified Time for Length (L) Shown, (min:sec)								
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet	
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24	
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48	
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38	
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04	
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41	
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31	
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33	
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48	
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15	
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:43	193:53	
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	203:46	

Note: Table SA-2 is taken from ASTM F1417 “Standard Test Method for Installation and Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air Test”. ASTM F1417 conforms to Uni-Bell “Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe” (UNI-B-6-98).

Q is the allowable leakage rate in cubic feet/minute/square foot of inside surface area of pipe.

d. Exfiltration Test

Exfiltration or leakage from the sanitary sewer line can be measured by recording the water level drop over a given period of time in a standpipe placed and connected in the upstream manhole. The measured drop in the time period can be converted by calculations to the leakage rate in terms of gallons per inch of pipe diameter per mile per day.

Exfiltration tests may be substituted for low pressure air tests where approved by YCUA. Exfiltration tests will not be allowed where the external water pressure exceeds 4’.

For the purpose of exfiltration testing, the internal water level shall be equal to the external water level plus 4’ as measured from the top of the highest pipe in the system being tested. This could be either a house lead or a lateral. However, the maximum total height of water above the invert of the pipe at the lower end shall not exceed 16’. A prospective test that would exceed this 16’ limit should

not be taken. The line under construction can be broken down into smaller sections such that the maximum head of 16' will not be exceeded.

The maximum exfiltration rate shall be the same as that permitted for the infiltration test. The exfiltration test procedure is summarized as follows:

- i. All service laterals, stubs and fittings into the sewer line(s) being tested shall be properly capped or plugged, and carefully braced to resist the thrust actions developed by the internal water pressure. In preparing the blocking of plugs or end caps, it is extremely important to recognize that the 5' to 10' of head in the standpipe will exert considerable thrust against the plugs or caps.
- ii. A plug is inserted and tightened in the inlet pipe of the downstream manhole to which the water supply connection is made for filling the pipe.
- iii. The upper manhole is plugged and securely tightened for connection to the standpipe. The standpipe is then placed in this manhole and connected to the tapped plug. The standpipe must be capable of handling from 5' to 10' of water head to determine the tightness and soundness of the sewer line, as specified and directed by YCUA.
- iv. Water is introduced into the line at the downstream manhole until the standpipe in the upstream manhole has been completely filled. By filling the line from the lowest level, the air in the line is easily pushed ahead and, finally expelled through the standpipe at the upper end of the test section. Care should be taken to minimize entrapped air that will give distorted test results. The rate of drop in the standpipe may be quite rapid until the air has been expelled.
- v. After filling with water, the line must be allowed to stand for at least 4 hours before beginning the test. During this time some water absorption into the manhole structures and sewer pipe will take place. After the water absorption has stabilized, the water level in the standpipe is checked and water added if necessary.
- vi. The test is now ready to begin. The drop in the standpipe is measured and recorded over a 15-minute period. To verify the first results, a second 15-minute test is suggested. This will also verify whether a stable condition exists in the line.
- vii. The measured drops in the standpipe are converted to leakage in terms of gallons per inch diameter per mile per day.
- viii. Another commonly used method of conducting water exfiltration testing is to utilize the manhole in lieu of a standpipe. The test procedure is exactly as outlined for using the standpipe. However, since the manhole is larger in diameter than the standpipe, this method normally requires a minimum 2 hour test period in order to be able to record a measurable water level drop. Manhole leakage must also be considered in the leakage rate and test results.

Caution should be taken when conducting exfiltration tests on sanitary sewer lines laid on steep grades. Consideration must be given to the downstream portion of the system to prevent excessive pressures in these lower lines. For these installations and where the upstream manholes are very deep, it is not advisable to fill the standpipe or manhole to the top when performing the test.

e. Deflection Test for Plastic Pipe

The allowable maximum deflection shall be 5% of internal pipe diameter. A deflection test gauge (Go, No-Go Gauge) as manufactured by Hurco Industries, Cherne Industries, or approved equal shall be used to verify that the maximum allowable deflection standard is met. The test gauge must have a minimum of 9 points. Proving rings must be provided to verify gauge diameter. The gauge shall be pulled through manually; force will not be allowed. Pipe with deflections greater than 5% will be considered unacceptable and shall be re-laid by the proprietor.

f. Closed-Circuit Television Inspection

As a means of insuring that pipe laying was properly done and that all joints are in a "home" position, the applicant shall be responsible for closed-circuit television inspection of all pipe installed that is 36" diameter and smaller. This shall be done no sooner than 30 days after sewer installation is complete. A minimum of 24 hours' notice shall be provided to YCUA prior to closed-circuit television inspection so that a representative may be present. The closed-circuit television inspection shall be recorded on acceptable digital file formats (DVD, thumb drive, downloadable file, etc.), a copy of which shall be provided to YCUA for review. A satisfactory review of the closed-circuit television inspection by YCUA shall be a condition for final acceptance by YCUA. Typical items to be reviewed on the digital file format will include pipe deflection, pipe settlement, lead connections, joints and pipe cleanliness. If the digital file format review reveals unsatisfactory conditions, the deficiencies shall be corrected and the affected pipe sections shall be re-inspected by the proprietor for review by YCUA.

VI. STORMWATER MANAGEMENT

General

1. Stormwater management systems shall be designed in accordance with the Washtenaw County Water Resources Commissioner's Office (WCWRC) Rules and Guidelines – Procedures and Design Criteria for Stormwater Management Systems, latest revision. The Township Planning Department and Engineer may modify these requirements on a case by case basis for sites that are not under WCWRC jurisdiction and not adding more than 1,500 square-foot of impervious surface to a site.

EGLE is required to review projects due to thermal/environmental sensitivity in the following watersheds: Chicking Ditch and Paint Creek watersheds.

2. A long-term stormwater management maintenance agreement may be required as prescribed by the Township. In the event an agreement is required, the agreement shall be submitted as part of final acceptance and project closeout.
3. Where possible, the applicant is strongly encouraged to propose low-impact stormwater management designs that limit the amount of runoff generated on site.
4. Restricted discharge rates and/or improvements to downstream drainage courses may be required as prescribed by the Charter Township of Ypsilanti Stormwater Master Plan of 1994. The applicant shall contact the Township Engineer and/or the WCWRC to determine what design criteria specified in the Stormwater Master Plan apply to the proposed project.
5. Where an approved point of discharge is not available on the site, the applicant shall make such offsite drainage improvements as are necessary to provide positive drainage to an approved outlet, as determined by the Township Engineer and/or the WCWRC. Such improvements shall be located in an easement secured by the applicant. The easement form and width of the easement shall be subject to Township approval.
6. Soil borings in the location of any proposed stormwater storage facility are required. Soil borings shall include groundwater surface elevation information. Where infiltration is proposed, infiltration rates shall be calculated. For facilities proposing basements, soil borings must be performed in a grid pattern within the buildable areas to show the ground water characteristics of the site.
7. Plan and profile views shall be provided for all proposed stormwater management system improvements. The plan and profile shall be presented on the same plan sheet and shall be vertically oriented.
 - a. Design calculations for all components of stormwater management systems, including but not necessarily limited to storm sewers, channels and detention facilities, shall be provided on the plans.

- b. A drainage area map shall be included on the plans. The map shall define the areas tributary to catch basins and inlets (including upstream and offsite areas). The design calculations shall include the determination of the weighted runoff coefficients for the areas tributary to each specific inlet or outlet. The design calculations shall also include justification for the initial time of concentration used for the storm sewer design calculations.
- c. The following information must be shown in the plan view of the proposed storm sewer system improvements:
 - i. Size, material and type of pipe.
 - ii. Length between structures.
 - iii. Slope of sewer between structures.
 - iv. Where required, a dedicated stormwater easement must be shown on the plans. The easement width shall be in accordance with the following:
 - (1) 12' for open drainage along rear and side property lines.
 - (2) A minimum of 20' for enclosed storm drains.
 - (3) A minimum of 30' for open swales (cross lot drainage).
 - (4) Top of casting and all invert elevations at each structure.
 - (5) Progressive numbering system on structures.
- d. The following information must be shown in the profile view of the proposed storm sewer system improvements:
 - i. Existing and proposed ground elevations.
 - ii. Size, material and type of pipe.
 - iii. Length between structures.
 - iv. Slope of sewer between structures.
 - v. Hydraulic gradient between structures.
 - vi. Top of casting and all invert elevations at each structure.
 - vii. All utility crossings.
 - viii. Special backfill areas, i.e. sand.
 - ix. Progressive numbering system.
 - x. Adjacent existing or proposed utilities plotted where parallel.
- e. Where storm sewer construction is proposed, the Charter Township of Ypsilanti standard storm sewer detail sheets must accompany the plans. The standard details are included in the Digital Appendix.
- f. A stormwater management long-term maintenance agreement and plan shall be provided. An example is provided in Appendix C.

Design Criteria

Components of stormwater management systems shall be designed in accordance with the requirements of the WCWRC, as noted previously. The WCWRC design criteria shall apply to all stormwater management system components, regardless of whether the facilities will be publicly dedicated or privately maintained at the completion of the project.

1. Stormwater discharge rates shall be determined as prescribed in item 1 of Part A of this section.

2. Surface runoff shall be determined as outlined by the WCWRC.
3. Stormwater conveyance systems shall be designed per the requirements prescribed by the WCWRC. The following are acceptable forms of stormwater conveyance:
 - a. Natural streams and channels.
 - b. Vegetated swales and open ditches.
 - c. Storm sewers. Enclosed storm sewer systems are generally comprised of the following elements:
 - i. Pipe
 - ii. Manholes
 - iii. Catch Basins
 - iv. Inlets
 - v. Sump pump leads shall be connected into an enclosed system and shall be tapped directly into storm sewer structures or cleanouts at or above the hydraulic grade line of the 10-year storm. Sump pump leads shall not be discharged directly to open surfaces.
 - d. Culverts.
4. Detention/Retention facilities shall be designed per WCWRC guidelines.
5. Underground detention/retention facilities shall include all required bedding, cleanouts and monitoring manholes and can only count up to 30% of void volume for storage or as determined to be acceptable by the WCWRC.
6. Access easements or areas to be specifically preserved for entry to perform maintenance shall be provided on all retention, detention, or infiltration facilities.
7. Low impact design (LID) and/or Best Management Practices (BMPs) for stormwater management is encouraged within Ypsilanti Township however must be in conformance with the Low Impact Design Manual of Michigan and also in compliance with the requirements of the WCWRC. Examples of low impact design include:
 - a. Bioretention (rain garden)
 - b. Detention basin
 - c. Infiltration basin/trench
 - d. Bioswale

Materials

1. Vegetative cover for natural streams and channels, open ditches and swales, as well as detention/retention facilities shall be in accordance with the requirements of the WCWRC.

2. Sewer Pipe

- a. Storm sewer pipe shall conform to the current American Society for Testing Materials “Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe”, ASTM C-76 for circular pipe, or ASTM C-507 for horizontal elliptical pipe, latest revision.
- b. If other materials are proposed for use, the applicant shall furnish the load carrying design analysis for the pipe for the proposed depth conditions.

3. Pipe Joints

- a. Pipe joints shall conform to the following requirements:
 - i. Modified Grooved Tongue (M.G.T.) pipe shall have a rubber gasket snapped into a groove cast into the tongue.
 - ii. The modified groove or bell end of the pipe shall be made smooth and shall have not over a 3.5% slope for sizes 10” – 24”, or a 2% slope for sizes 27” – 108”, tapered to fit the rubber gasket to tolerances as determined by the gasket manufacturer.
 - iii. Rubber gasket joints shall be in accordance with the Specification for “Joints for Concrete Pipe and Manholes, using Rubber Gaskets,” ASTM Designation: C-443, latest revision.
 - iv. Rubber gasket joints shall be lubricated and coupled in accordance with the pipe manufacturer’s printed instructions.

4. Manholes

- a. Manholes shall be precast reinforced concrete sections in accordance with the Ypsilanti Township Standard Details as seen in the Digital Appendix.
- b. Precast reinforced concrete manhole sections shall conform to the requirements of the American Society for Testing and Materials, “Specifications for Precast Reinforced Concrete Manhole Sections, ASTM Designation C-478, latest revision.
- c. Wall thickness shall depend on depth and shall be subject to the approval of the Township’s Engineer.
- d. Pre-cast or HDPE grade adjustment rings are encouraged under paved areas.
- e. Brick for casting adjustment or concrete block for manhole, inlet, and catch basin construction shall conform to the requirements of the current Michigan Department of Transportation “Standard Specifications for Construction,” latest revision. Wall thicknesses shall depend on depth and shall be subject to the approval of the Township’s Engineer.

- f. Pre-cast manhole joints shall be as described in Section IV. Materials.3.a.iii, Stormwater Management, Materials, Pipe Joints.
- g. A minimum of three to a maximum of six adjustment courses shall be placed above the top of the cone section on all precast or block manholes.
- h. Manhole covers and frames shall be East Jordan Iron Works #1040 with Type "B" cover, or approved equal. All storm structures receiving runoff shall include raised lettering reading "Dump no waste, Drains to Waterways" and a fish logo.
- i. The entire outside surface of all concrete block and brick masonry portion of drainage structures shall be plaster coated with ½" thick mortar.
- j. All manholes on storm sewers 18" in diameter and smaller shall have 2' deep sumps unless otherwise called for on the plans.

5. Catch Basins

- a. Catch basins shall be constructed of brick, precast manhole blocks, or precast reinforced concrete manhole sections, as described in Part 4 of this section, in accordance with the Ypsilanti Township Standard Details.
- b. Pavement catch basin and inlet frames and grates shall be in accordance with the requirements of the Washtenaw County Road Commission.
- c. Lawn catch basin and inlet frames and grates shall be East Jordan #1000, with Type "N" grate, or approved equal. All storm structures receiving runoff shall include raised lettering reading "Dump no waste, Drains to Waterways" and a fish logo.
- d. Ditch catch basin frames and grates shall be East Jordan #1000, with Type 01 Beehive grate, or approved equal.
- e. Parking lot catch basin frames and grates shall be selected at the discretion of the applicant's engineer, but shall be capable of carrying the anticipated traffic loads, and shall have sufficient opening area to receive the design stormwater runoff. Where possible, catch basins shall be placed out of the expected wheel paths of vehicles. When catch basins are placed within areas of travel, a concrete apron shall be provided.

Construction Methods

1. Construction Progress

Unless otherwise permitted by the Township Engineer and/or the WCWRC, construction of storm sewers shall begin at the outlet end of the sewer and proceed upgrade.

2. Certification and Inspection

All pipe and fittings delivered to the job shall be accompanied by certification papers showing that pipe and fittings have been tested in accordance with the applicable specifications and that pipe and fittings meet the specifications for this project. All pipe and fittings will be inspected upon delivery to the job site. No cracked, broken or damaged pipe or fitting will be allowed in this work. Rejected pipe and fittings will be immediately removed from the job site.

No pipe or fittings known to be defective shall be laid in the work. Any piece found to be defective after it has been laid shall be removed and replaced with a sound piece. If the major part of a defective pipe is sound, the good end may be cut off and used. Every such cut shall be square and ground smooth. Cut surfaces of ductile iron pipe shall be painted with two coats of approved asphaltum metal protective paint where required by the Township.

Full time inspection is required by the Township Engineer for all underground storm sewer infrastructure.

3. Excavation

Excavation, bedding, and backfill for open cut pipe installations and structures shall be accomplished in accordance with requirements in the Grading and Earthwork Section.

4. Laying Pipe

a. Handling Pipe and Fittings

All pipes and castings shall be unloaded and distributed along the line of work in such manner and with such care as will effectually avoid damage to any pipe or fitting. Dropping pipe or fittings directly from the truck will not be permitted. Care must also be taken to prevent abrasion of the pipe coating. Wherever the coating may have been rubbed off, the part shall be recoated as may be required by the nature of the pipe coating.

b. Placement of Pipe

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

Construction shall begin at the outlet end and proceed upgrade with spigot ends pointing in the direction of flow. Pipes shall be laid on a minimum 4" MDOT class II natural sand cushion. A 6" MDOT class II natural sand cushion shall be provided if called for on the plan details. All plastic pipe bedding shall be clean course aggregate 6A, 6AA, or peastone. If the subgrade has been disturbed so that refilling is necessary to bring the pipe to grade, such refilling shall be done with MDOT 6A coarse aggregate thoroughly tamped in place. Bell holes shall be excavated so that the full length of the pipe barrel will bear uniformly on the sand cushion.

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

c. Line and Grade

Pipe shall be carefully laid to line and grade and shall have bearing over its entire length except at joints where the joint hole shall be of such size as to give adequate room for working. Pipe shall be laid with a minimum cover (2.5') as shown on the standard details. When a pipe laser is not used, elevations will be taken and recorded at each pipe bell, and a transit, plumb bob, or other line of sight device will be used to maintain line.

d. Excavation Below Bottom of Pipe

As a result of construction procedures or where excavation has not uncovered a stable foundation subgrade at a depth of 6" below the bottom of the proposed pipe, excavation shall continue downward below the bottom of the proposed pipe to reach stable foundation soil. The space resulting from such excavation and the pipe bedding shall be filled and constructed with MDOT 6A coarse aggregate and bedding as specified in the Grading and Earthwork section.

e. Laying and Bedding of Pipe

Pipe installation shall be made in accordance with the published installation guide of the pipe manufacturer except as otherwise specified herein. Whenever instructions given by the manufacturer are at variance with the provisions specified herein, the laying standards provided herein shall govern.

Proper tools, including pipe pullers, special cutters, spacing yokes, machining tools, test caps, ring feeler gauges, etc. shall be provided at the site of the work for installation of the pipe.

Immediately before laying each section of pipe or fitting, it shall be thoroughly cleaned of all debris, dirt or other accumulated foreign material. It shall be inspected for damage to the coating or pipe material and repairs shall be made where required. If deemed irreparable by the Township Engineer, then it shall be removed from the job site. Care shall be taken to keep the interior of previously laid pipe clean and free from dirt and other foreign material. Bulkheads or other means shall be used at the open end of the previously laid pipe for this purpose.

After a length of pipe is placed in the trench, the spigot shall be centered in the bell of the adjacent pipe, the pipe shoved into proper position in the collar or bell and brought into true alignment. The pipe shall then be secured with MDOT class II natural sand, or clean coarse aggregate 6A, 6AA, or peastone for plastic pipe that is carefully tamped under and on each side of the pipe.

f. Concrete Cradle for Pipe

Where required, pipe shall be installed with a cradle of MDOT Grade S3 concrete.

Each pipe shall rest on a 6" minimum thickness bed of dry mix concrete that is shaped to fit the bottom of the pipe. The dry mix concrete shall be MDOT Grade S3.

After setting the pipe, the space between the outside of the pipe and the undisturbed trench bank shall be filled to a level equal to a point 1 foot above the top of the pipe with MDOT Grade S3. The concrete shall have a 5" slump and be mechanically vibrated to insure complete filling of the annular space between the excavated face of the original ground and the outside face of the pipe.

g. Pipe Placed in Casings

Pipes will be placed in casing pipe in the locations shown on the drawings. Under this work the contractor will place the carrier pipe, fill the annular space between the casing and carrier pipe, place bulkheads, and complete all backfilling.

For road crossings, all void spaces between the casing pipe and the carrier pipe will be filled with sand meeting the requirements of MDOT 2NS natural sand. Sand will be placed by flushing or other methods approved by the Township Engineer. The contractor will furnish the Township Engineer with information on the quantity of sand placed.

The annular space at the ends of the casing pipe will be bulkheaded with a minimum of 12" thick solid masonry with a 1/2" fiberboard cushion between the masonry and carrier pipe.

All necessary skidding materials required to protect the carrier pipe will be furnished by the contractor.

h. Jointing

Where pipe is laid in wet trenches, trenches with running sand, or in trench conditions where manual means will not allow pushing the pipe home, mechanical means shall be utilized for pulling the pipe home and holding the pipe joints tight until completion of the line. Mechanical means shall consist of a cable placed inside the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

All joints on elliptical concrete pipe (42" equivalent diameter and larger) shall be cement mortar pointed on the inside.

i. Gravity Pipe

Where pipe is laid in wet trenches, trenches with running sand, or in trench conditions where manual means will not allow pushing the pipe home, the applicant shall provide and use mechanical means for pulling the pipe home and holding the pipe joints tight until completion of the line. Mechanical means shall consist of a cable placed inside the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

j. Pressure Pipe

Refer to the Water Supply System Section for acceptable construction methods and approved materials for joints and joint restraint for ductile iron pressure pipe.

k. Backfill

Backfill shall be placed in accordance with the Grading and Earthwork section.

5. Structures and Appurtenances

- a. Construction methods for drainage structures shall conform to section 403.03 of the current Michigan Department of Transportation Standard Specifications for Construction except as herein provided.
- b. All precast sections shall bear the stamp of an approved laboratory as having been tested and delivered from tested stock of the manufacturer.
- c. Precast sections shall be constructed so that no more than 50% of the circumference, measured on the inside face, is deleted on any horizontal plane for sewer pipe openings. There shall be no less than 12" of residual concrete measured on any horizontal plane between pipe openings.
- d. Excavation shall be carried to the depth required to permit the construction of the base in accordance with the requirements of the Ypsilanti Township Standard Details. The excavation shall be sufficiently wide to allow for shoring, bracing, or formwork, should any or all be necessary. Also, the excavation shall allow for accessibility in plastering the exterior of all brick masonry. The bottom of the excavation shall be trimmed to a uniform horizontal bed to receive the concrete base. The excavated section shall be completely dewatered before any concrete is placed therein. The standard details are included in the Digital Appendix.
- e. With the exception of drainage structures having sumps, the bottom of the structures shall be channeled to provide for smooth flow through the manhole. Channels shall be formed using MDOT Grade S3 concrete.
- f. Connections to manholes shall be properly supported and braced.

6. Stubs, Connections, and Bulkheads

- a. Existing sewers shall be connected in where called for on the plans. Bulkheads shall be placed or removed where called for on plans.
- b. Unless otherwise noted on the plans, stubs shall consist of one length of sewer pipe with watertight stopper bulkhead or, where approved by the Township Engineer, a brick and mortar bulkhead. Pipe stubs shall be of the same material as the sewer to which they connect unless specified otherwise.

7. Cleaning

- a. All sewers shall be thoroughly cleaned before final acceptance.

8. Testing

a. General

The applicant shall be responsible for providing all necessary equipment and labor for making the tests.

b. Deflection Test for Plastic Pipe

The allowable maximum deflection shall be 5% of internal pipe diameter. A Deflection Test Gauge (Go, No-Go) as manufactured by Hurco Technologies, Cherne Industries, or approved equal shall be used to verify that the maximum allowable deflection standard is met. Pipe with deflections greater than 5% will be considered unacceptable and shall be replaced.

c. Digital Recording (Public Storm Sewers)

As a means of insuring that pipe laying was properly done and that all joints are in a "home" position, the applicant shall provide for digital recording of 10% of the pipe footage laid (pipe 36" diameter and smaller), with no less than one manhole run being televised on each project. The Township Engineer shall review and approve which pipe runs are to be recorded. The recording shall be done no sooner than thirty (30) days after sewer installation is complete. The applicant shall provide 24 hours notice to the Township Engineer prior to recording so that a representative may be present. A small amount of water must be poured in the pipe before recording to ensure identification of low spots. A satisfactory review of the DVD by the Township Engineer shall be a condition for sewer acceptance by Ypsilanti Township. Typical items to be reviewed on the DVD will include pipe deflection, pipe settlement, connections, joints and pipe cleanliness. If the DVD review reveals unsatisfactory conditions, all deficiencies shall be corrected and the affected pipe sections re-televised for review by the Township Engineer.

VII. PAVING IMPROVEMENTS

General

1. All roads proposed for construction in Ypsilanti Township shall be public roads under the jurisdiction of Washtenaw County Road Commission (WCRC) unless otherwise permitted by Township ordinance. Plans for such roads and/or accompanying sidewalks/pathways shall be prepared in accordance with the current WCRC "Procedures and Guidelines for Developing Public Roads," and the AASHTO Guide for the Development of Bicycle Facilities. In addition to any submittals required for WCRC approval, plans shall also be submitted to the Charter Township of Ypsilanti for review of the proposed road improvements in relation to other existing and proposed facilities. The applicant shall submit three sets of WCRC approved paving plans to the Township upon County approval.
2. Private roads, when permitted, shall conform to the requirements of the Township Municipal Code, Chapter 47, Article II, Sections 47-26 thru 47-36.
3. Paving improvements for parking lots, internal roads and pedestrian facilities on private sites shall be designed in accordance with the requirements prescribed herein.
4. Concrete curb and gutter will be required for all private roadway construction and parking lot construction with the following exceptions:
 - a. Large lots of one acre or more for residential detached housing.
 - b. Industrial storage yards not used for regular road vehicle parking.
 - c. Where directly adjacent to a stormwater BMP where the applicant is proposing to sheet flow water and infiltrate.
 - d. Bituminous curb is not permitted.
5. Underground storm sewers, including edge drains for parking lots and roads, shall be designed and installed with all paving improvements which require concrete curb and gutter or asphalt curb. Where pavements are to be constructed over clay soils or other poorly drained soils and a granular sub-base is used, an approved sub-drainage system shall be installed.
6. Plan and profile views shall be provided for all proposed paving improvements. The plan and profile shall be presented on the same plan sheet and shall be vertically aligned. If possible, storm water management improvements shall be shown on the same plan sheet as the paving improvements.
 - a. The plans shall include typical cross section(s) showing dimensions, materials, type and thickness of the proposed paving improvements.
 - b. The following information shall be shown in the plan view of the proposed paving improvements:

- i. Existing right-of-way or road easement as well as the proposed right-of-way or road easement. A minimum 12-foot-wide easement for private franchise utilities shall be provided adjacent to each side of the proposed right-of-way or road easement.
 - ii. Centerline alignment, including curve data, stationing, edge of pavement and/or curb. Centerline and stationing are not required for parking lots.
 - iii. Location of existing and proposed topographic features, including utilities.
 - iv. Location of existing and proposed traffic control devices.
 - v. Location of existing and proposed street-light poles.
 - vi. Location of all proposed pedestrian facilities. Pathways may be required by the Township in lieu of sidewalks.
- c. The following information shall be shown in the profile view of the proposed paving improvements. Profiles are not required for proposed parking lots.
- i. Existing and proposed ground at the centerline (for rural roads) or top of curb (for urban roads).
 - ii. Percent of grade and vertical curve data.

Design Criteria

1. Cross Sections

- a. Dimensional widths and thickness of materials and associated road features shall be designed in accordance with the typical road cross sections prescribed by the WCRC. For public roads, the cross section requirements will be based on the functional class of the road as designated by the WCRC.
- b. For parking lots and internal roads at nonresidential sites, the cross section requirements will be based on the functional class of the public road serving the property. The minimum width for an internal drive shall be 26' measured from the back-of-curb to back-of-curb or edge of pavement to edge of pavement for non-curbed internal roads.
- c. Driveways will be defined as the paved area adjacent to a public or internal road serving no more than one residence, commercial or industrial establishment.
 - i. Single family residential driveways shall be designed according to the following criteria:
 - (1) Concrete driveways shall be a minimum of 6" thick between the back of curb or edge of pavement and the right-of-way or easement line. Concrete driveways outside the right-of-way or

easement shall be a minimum of 4" thick. All sidewalks within four feet of the back of curb shall be 6 inches thick.

- (2) Bituminous pavement driveways shall be a minimum of 3" thick over an aggregate base course having a minimum thickness of 6".
 - (3) Aggregate surface course driveways will only be permitted where the adjacent public or internal road does not have a paved surface. The aggregate surface course shall be a minimum of 6" thick within the right-of-way or easement and a minimum of 4" thick outside the right-of-way or easement.
- ii. Driveways to serve multi-family residences, commercial or industrial establishments shall be designed with the same cross section as the corresponding parking lot or internal road.
 - iii. Driveways within subdivisions must be paved if it is a platted subdivision or a site condominium. If it is a non platted subdivision the paving of the driveways will be determined by the township Planning Department on a case by case basis.
- d. Pedestrian facilities including the inclusion of an accessible route as required by the American's with Disabilities Act (ADA) shall be designed in accordance with the requirements prescribed by the ADA, WCRC, and MDOT.

2. Horizontal Alignment

- a. Horizontal alignment of pavement and associated road features shall be designed in accordance with the requirements prescribed by the WCRC.
- b. Internal roads shall be designed to accommodate the typical vehicles anticipated to use the site, including but not necessarily being limited to, delivery vans and trucks, fire department traffic, trash collection vehicles and school buses.
- c. Parking lots and off street loading and unloading areas shall be designed in accordance with the requirements prescribed by sections 2105 and 2106 of Appendix A of the Zoning of the Charter Township of Ypsilanti Code of Ordinances. If the proposed parking abuts a proposed sidewalk that will be 7 feet wide adjacent to a building, the parking space length may be reduced by 18 inches to allow for 2 foot of overhang by a parked vehicle.
- d. Driveways
 - i. Single family residential driveways shall be a minimum of 9' wide.
 - ii. Driveways to serve multi-family residences, commercial or industrial establishments shall be a minimum of 31' wide.
 - iii. Offset parking areas adjacent to driveways shall be configured with a 25' radius as shown in the standard details.

e. Pedestrian facilities shall generally be located inside the right-of-way. Facilities located outside public right-of-way shall be located within a dedicated easement. Pedestrian facilities will be located within the right-of-way with the permission of the WCRC. The horizontal alignment of pedestrian facilities shall be as close to parallel as practical to the right-of-way or easement.

i. Concrete sidewalk shall be a minimum of 5' wide.

ii. Bituminous pavement bike paths shall be a minimum of 10' wide.

3. Vertical Alignment

a. The vertical alignment of all public roads, internal roads and parking lots shall be designed in accordance with the requirements prescribed by the WCRC.

b. Vertical alignment of driveways shall be designed in accordance with the requirements prescribed by the WCRC.

c. Pedestrian facilities shall be designed to meet the requirements of the American with Disabilities Act, as amended.

4. Materials

a. Subgrade

i. Subgrade material shall consist of loam, clay, sand, gravel or other similar material.

ii. The finished subgrade surface shall be free of all topsoil, stones, stumps, organic matter, muck, peat and frost heave material.

b. Underdrainage

i. Underdrain pipe shall be smooth plastic pipe or corrugated plastic tubing meeting Michigan Department of Transportation (MDOT) requirements.

ii. Underdrain outlets shall be constructed of polyvinyl chloride (PVC) plastic pipe or corrugated steel pipe conforming to MDOT requirements.

iii. Subbase materials shall conform to the requirements of MDOT Class II granular material compacted in place.

c. Aggregate Base Course

i. Dense graded aggregate conforming to the requirements for MDOT Specifications 21A, 21AA or 22A, compacted in place.

ii. The use of slag material will not be permitted.

- iii. The use of stabilized base course will be permitted. The type, thickness and mix must conform to MDOT requirements and must be approved by the Township Engineer.
 - iv. Bituminous pavement materials shall be in accordance with MDOT requirements as specified on the typical cross sections prescribed by the WCRC.
 - v. Concrete pavement materials shall be in accordance with MDOT requirements as specified on the typical cross sections prescribed by the WCRC.
- d. Pavement
- i. Driveway material shall be equal to or better than the road service the driveway is connecting to.

Construction Methods

1. Construction methods shall be in accordance with the plan details and the 2003 MDOT Standard Specifications for Construction.
2. Pavement Cuts
 - a. Where a trench must be cut through pavement, driveway, or sidewalk, particular care shall be taken to avoid unnecessary damage to adjoining areas of the pavement, driveway or sidewalk.
 - b. All cuts through existing surfaces shall be made full-depth with a concrete saw. Cuts in concrete pavement shall be made parallel with longitudinal and transverse construction or contraction joints.
 - c. Saw cuts in concrete pavement shall not be nearer than 5' to a transverse joint, to the centerline of pavement, or to the edge of pavement or curb. No existing or replacement pavement shall be less than 5' to a joint or centerline of pavement, or to edge of pavement, surfacing or curb; removal and replacement shall be extended to said joint, centerline, edge of pavement, surfacing, or curb. These same requirements shall apply to the saw cutting and replacement of concrete driveways.
 - d. If a square or block of sidewalk is cut, broken, or cracked, the entire square or block shall be removed and replaced.
3. Pavement Replacement, Temporary
 - a. All pavements removed in crossing and/or paralleling paved streets, alleys, drives and parking areas shall be temporarily replaced immediately following completion of backfilling operations. Temporary pavements for streets and alleys shall conform to the WCRC specifications for underground construction. Temporary pavement for driveways, including approaches and parking areas, shall consist of a minimum of 3" of compacted cold patch asphalt over a

minimum of 7” of compacted MDOT 22A aggregate base. All temporary pavements, including those constructed for streets, alleys, drives and parking areas, shall be maintained in good condition until the final pavement replacement is made.

4. Testing

- a. Density reports on private developments are required to be provided to the Township Engineer for sub base, base and paving course construction. Testing reports will also be required for all paving in the right-of-way for all applicable agencies.

5. Inspection

- a. The Township Engineer shall be contacted prior to the preparation and placement of any of the following materials for roadways and pedestrian facilities:
 - i. Subbase and underdrain
 - ii. Aggregate base course
 - iii. Paving course

VIII. GRADING AND EARTHWORK

General

1. All proposed developments should be graded such that storm water runoff will be intercepted within the boundaries of the site and conducted through a storm sewer system to an approved point of discharge.
2. Easements for surface drainage shall be dedicated and recorded.
3. For perimeter lots, the drainage easement width shall be 20' minimum, and for abutting lots with a common rear yard lot line, the easement width shall be at least 10' on each lot.
4. The following information must be shown in the plan view of the proposed grading:
 - a. Grading plans shall be drawn to a scale of 1" = 50' or larger.
 - b. The grading plans shall show the existing elevation topography either by contour method or grade point grid method.
 - c. High and low street grade points, slope direction (by arrow) and the location of all catch basins, inlets and drainage ditches shall be shown on the grading plan.
 - d. For subdivisions, a detail of the typical lot drainage pattern shall be shown on the grading plan with all grade control points identified. All grade point elevations shall be shown for each lot per Detail A or B illustrated in the standard details included in the Digital Appendix. This will include the finish floor (F.F.), or the foundation grade (F.G.) elevations, high point (grade break), drainage arrows and additional spot elevations to clarify site grading.
5. Plot plans shall be provided in accordance with the requirements prescribed in Appendix A.
6. A preconstruction meeting must be held and all applicable requirements fulfilled prior to any grading, earthwork, clearing or grubbing occurring on-site unless specific approval is granted from the Township Engineer and/or OCS Department. A SESC permit waiver may be permitted for earth changes of less than 225 square-feet.

Design Criteria

1. General
 - a. Grading plans shall take into account the desirable natural features and the character of the land, which must be preserved where possible.
 - b. No filling will be allowed in any areas of land which lie either wholly or in part within the flood plain of a river, stream, creek, or lake. Only a variance in the form of a permit from the Michigan Department of Environment, Great Lakes, and Energy may override this restriction.
 - c. Filling and grading shall not create a barrier causing entrapment of water on the adjacent lands of others.

- d. Retaining walls are discouraged. Any wall separating a grade differential exceeding 18-inches will require a special detail on the plan and require the review of a structural engineer.

2. Drainage Pattern

- a. Generally, all single-family lots shall be graded for front to rear drainage per Standard Detail A.
- b. Standard Detail B (rear to front drainage) will be allowed by the Township Engineer only where, due to existing topography, rear to front drainage would be very difficult to achieve or not feasible.
- c. Drainage patterns other than those shown in Details A and B may be used. All non-conforming lots with drainage patterns other than those in Standard Details A or B shall be noted on the grading plan. Each will be reviewed on a case-by-case basis.
- d. Large acreage parcels, outside of approved subdivisions/site condominiums, will be reviewed on an individual basis.

3. Slopes

- a. All areas within 10' of buildings shall slope away from the building at a minimum slope of 5%. The minimum slope for any other part of the site shall be 1%.
- b. A maximum slope of 4' horizontal to 1' vertical shall not be exceeded for terracing. The toe of slope shall be located outside of the rear and/or side lot line drainage easements.
- c. Swales
 - i. Each single-family lot shall be graded to drain away from the house to swales constructed along the lot lines.
 - ii. Swales shall discharge to a catch basin, roadway gutter, or other approved drainage course.
 - iii. The longitudinal slope along a rear or side yard drainage swale shall be not less than 1.5% or more than 6.0%.
 - iv. Plans may not include any structures, landscaping or other permanent objects within swales.
 - v. Bio-swales or Vegetated Swales proposed to promote groundwater infiltration are acceptable but must be designed in accordance with the current Low Impact Development Manual for Michigan (LID Manual for Michigan) and in conformance with the Washtenaw County Water Resources Commissioner's Office.
- d. Maximum distance from a high point to a drain outlet shall not exceed 250' or two lots, whichever is the lesser.
- e. In general, for streets with ditches and no curbs, the elevation of the front lot line shall be at least 6" above the centerline of the road.
- f. Driveway slope gradients shall not exceed 8%.
- g. Longitudinal sidewalk slopes shall not exceed 5%. All pedestrian facilities shall meet the requirements of ADA.

Materials

1. Materials used in earth excavations and/or embankment construction shall be in accordance with the plans and the 2003 Michigan Department of Transportation (MDOT) Standard Specifications for Construction.
2. Material placed in future building sites, roadways or other areas that may support structures shall be free of trees, stumps, topsoil or any other surplus or unsuitable materials.

Construction Methods

1. Methods of Excavation in Earth

All excavation shall be by open cut from the surface, except in special cases where boring/jacking under pavement or structures may be required, or where boring/jacking under the root system will be required for tree root protection. All excavation shall be made in such a manner and dimensions as will give ample room for:

- a. Building the structures.
- b. Bracing, sheeting and supporting the sides of the excavation.
- c. Pumping and drainage of ground water and sewage which may be encountered.
- d. Removal of all materials excavated. Special care shall be taken so that the soil below the bottom of structures to be built shall be left undisturbed so that a firm bed will be provided for construction. Any voids shall be backfilled with suitable granular material and shall be properly compacted.

2. Trench Excavation

a. General

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

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

If the maximum trench width as specified above is exceeded, unless otherwise shown on the drawings such concrete cradling or other bedding as is approved by the Township Engineer shall be installed to support the added load of the backfill.

Where trench excavation is in granular material, the last 6" of trench depth shall be carefully excavated and trimmed by hand to the exact elevation and contour of pipe. Where trench excavation is in rock or clay soil, the trench bottom shall be

undercut a minimum of 4" below the final bedding material elevation of pipe. The bedding material as hereinafter specified shall be placed and compacted to the underside of the pipe.

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

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

b. Bedding

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

c. Amount of Trench Opening

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

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

3. Stone Refill

In locations where soil at the bottom of trench is unstable the trench shall be excavated (undercut) below the trench bottom and refilled with MDOT 6A crushed aggregate.

4. Excavation & Trench Dewatering

Any excavation or trench shall be maintained free of water during construction of any structures and/or pipelines.

Adequate precautions shall be taken to control the discharge of dewatering pumps so as to prevent soil erosion or sedimentation of drainage ditches, structures, storm sewers, culverts, natural drainage courses, ponds, lakes or wetlands. If ground water is discharged to a County Drain then a permit may be required by the Washtenaw County Water Resources Office.

Discharge from any dewatering operations shall have a suitable outlet and cause no damage to adjacent dwellings or property. Water and discharge hoses shall be

placed and/or controlled so as to prevent a hazard to pedestrians or motor vehicles passing in the vicinity of the construction site.

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

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

5. Diverting Existing Sewers

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

6. Sheeting, Bracing & Shoring

Sheeting, bracing and shoring shall be provided where required to properly support the surfaces of excavations and protect the construction work, adjacent work, and workers. In removing the sheeting and bracing after the construction has been completed, special care shall be taken to prevent any caving of the sides of the excavation and injury to the completed work or to the adjacent property.

7. Crossing Existing Structures/Pipes

During construction, it may be necessary to cross under certain sewers, drains, culverts, water lines, gas lines, electric conduits and other underground structures. Every effort shall be made to prevent damage to such structures. Wherever such structures are disturbed or broken, they shall be restored to good condition. Specified granular backfill shall be placed as described in item 9, Backfilling. MDOT Grade 30S concrete can be utilized where approved by the Township Engineer. Either granular backfill or concrete shall be brought to the spring line of the higher utility.

8. Tunneling Trees

Trees 8" in diameter or less will require a minimum tunnel length of 8'. Trees over 8" in diameter, measured 4' above the ground surface, will require a minimum tunnel length equal to one foot for each inch of tree diameter.

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

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

- a. Boring and jacking casing pipe along with placement of a carrier pipe.
- b. Boring and jacking sewer pipe or water main without a casing pipe.
- c. Jacking sewer pipe or water main without boring and without a casing pipe.

9. Backfilling

- a. General

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

Trenches and/or other excavations shall be backfilled with suitable excavated material (not including gray or blue clay) replaced into the trench or excavation and compacted to not less than 95% of maximum unit weight as determined at existing moisture content during backfilling. Compaction shall be provided by means of suitable mechanical compaction equipment.

If the moisture content of cohesive backfill material exceeds the optimum moisture content for maximum density by more than 3%, the material shall be dried to meet the foregoing moisture content limitation or MDOT Class II Granular Material shall be provided. No sloppy or wet backfill will be allowed.

Maximum unit weight will be determined by current methods of Test for Compaction and Density of Soil, AASHTO Designation T-180 or by the Cone Density Method developed by MDOT, as the material may require.

Compaction tests shall be conducted at all locations requiring granular backfill. Such tests shall be the responsibility of the applicant.

Any depression resulting from settlement of any backfill shall be brought to the proper grade and surface and made to match the adjacent surface.

b. Compaction

Backfill material shall be placed in layers not to exceed 12" in thickness unless approved by the Township Engineer.

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

If excavated material is not suitable to obtain 95% minimum compaction, unsuitable materials shall be removed or granular materials shall be added, or both, to obtain 95% minimum compaction as specified.

c. Backfilling Trenches

i. Bedding

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

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

Bedding placed on the sides of and above the pipe shall be compacted by machine tamping to not less than 95% of maximum unit weight in layers not exceeding 12" in depth.

ii. Trench or Excavated Area

All trenches in paved streets, shoulders, traveled roadways, parking areas and driveways shall be backfilled with suitable excavated backfill or granular backfill, as shown on the drawings from 1' above top of pipe up to the required subgrade elevation which will allow for placement of the required gravel base and/or pavement surface. The approved excavated backfill or granular backfill shall be placed and thoroughly and uniformly compacted by

machine tamping to the specified compaction. With the approval of the Township Engineer, water jetting may be accepted in lieu of tamping for granular backfill only.

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

Trenches under concrete sidewalks and bike paths shall be backfilled from one foot above top of pipe to a level 4" below finished grade of the sidewalk with approved suitable excavated backfill or granular backfill and compacted to 95% maximum density.

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

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

d. Backfilling Around Structures

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

10. Disposal of Excavated Material

After all suitable excavated material has been used on site, all excess material shall be removed and disposed of properly.

All other excavated materials that are unsuitable for use as fill or backfill shall be disposed of properly. Unsuitable materials may include, but are not limited to, broken concrete, asphalt, rock, stone, and other related debris. The applicant shall be required to obtain proper disposal areas and permits.

Any agreements that the applicant makes with local residents concerning the placement of fill on private property shall be the sole responsibility of the applicant. Copies of such agreements shall be provided to the Township.

Placement of fill on private property may require that the property owner and/or the applicant obtain a grading permit or fill permit from the Township.

11. Contractor Safety Requirements

All construction operations shall be performed in accordance with OSHA and MiOSHA requirements.

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

Trench sides shall be either cut back to the slope as required by soil and ground water conditions which will provide stable sides, or supporting systems shall be installed that are capable of restraining the earth sides from movement. Design and installation of trench supporting systems shall be the responsibility of the applicant.

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

Excavated material, heavy equipment, backfill materials, sewer pipe, or other construction materials shall not be stored along or adjacent to the trench where they may impose too great a load on the earth and cause displacement or caving of the earth. A safe means of emergency exit shall be provided at all times from all trench excavations.

IX. SOIL EROSION AND SEDIMENTATION CONTROL

General

1. Soil erosion and sedimentation control measures shall be incorporated into the design and construction of all projects as specified by Ypsilanti Township Office of Community Standards (OCS) and/or the Michigan Department of Environment, Great Lakes, and Energy (EGLE). All projects shall be designed and constructed so as to minimize soil erosion and sedimentation impacts to the environment.
2. A permit must be obtained from either the Ypsilanti Township OCS and/or EGLE.
3. All proposed temporary and permanent soil erosion and sedimentation control measures shall be shown on the plans. All soil erosion control measures shall be identified in accordance with the Michigan Unified Keying System.
4. Cleaning and maintenance schedule listing annual budget and frequency of maintenance operations shall be indicated on the plans.

Design Criteria

1. Temporary and permanent soil erosion and sedimentation control measures shall be designed in accordance with the requirements of the WCSSED and/or EGLE. At a minimum, the following shall be provided for all project:
 - a. Silt fence;
 - b. Inlet filters;
 - c. Gravel tracking mats at any point of ingress or egress to a construction site to a length not less than 50 feet and where possible to a length of 100 feet.

Materials

1. Temporary soil erosion and sedimentation control measures shall be fabricated of the materials specified in the latest edition of the Best Management Practices (BMP) guidelines published by the EGLE and/or the Washtenaw County requirements.
2. Permanent soil erosion and sedimentation control measures shall be in accordance with the material requirements specified in other sections of above-mentioned standards.
3. The use of straw bales may only be permitted with written approval from the Township and otherwise will not be permitted in Ypsilanti Township.

Construction Methods

1. Soil erosion and sedimentation control measures shall be the first activity on site.
2. Temporary soil erosion and sedimentation control measures shall be installed and maintained as outlined in the latest edition of the BMP guidelines published by the EGLE.
3. Permanent soil erosion and sedimentation control measures shall be constructed and maintained in accordance with the cleaning and maintenance schedule shown on the approved soil erosion and sedimentation control plan and as described in the required permit.
4. All lots within approved residential subdivision/site condominiums shall have the disturbed ground stabilized with sod, seed, or other acceptable permanent soil erosion control measures prior to the issuance of the final certificate of occupancy. Inclement weather exceptions will be made from November 15th through June 15th as determined by the Ypsilanti Township CED.
5. A soil erosion and sedimentation control inspection escrow deposit must be made in an amount to be determined by the Township Planning Director, building Director or an authorized agent of the township. This deposit is required to conduct necessary inspections during the construction phase. If the escrow is depleted prior to the issuance of the final certificate of occupancy, then the escrow account must be replenished to a level determined by the Township.
6. Standard SESC details have been included in the Digital Appendix and should be included with plan sets. If special SESC provisions are being proposed or required, then special details and/or notes may be needed in addition to the standard details.

Appendix A

A-1: Site Plans

A-2: Plot Plans

A-3: Detailed Engineering Plans

A-4: SESC Plans

A-5: Record Drawings

A-6: Structural Reviews

Check List for Preliminary Site Plans

The following checklist is intended to serve as a guide for designers to review prior to submitting plans to the Township for review. While the checklist covers all major areas that will be reviewed by the Township's Engineer, the list is not all-inclusive, and the Township Engineer may comment on items not listed herein.

Topography

- A complete topographical survey is required for all proposed projects. A mete and bounds legal description of the project site shall be provided on the plans. Property lines shall be indicated by bearing and distance in the plan view. All existing easements shall also be shown on the plan view of the existing conditions.
- A minimum of two benchmarks are required. All benchmarks shall be clearly indicated on the plans. All elevations shall be to North American Vertical Datum 1988 (NAVD-88) and shall be in state plane coordinates.
- Existing offsite elevations must be given at a minimum of 50 feet and 100 feet abutting the entire perimeter of the site. Grades will be indicated at all property corners and along all property lines. On-site, intermittent elevations and/or defined contours (minimum contour interval of 2 feet) are required to establish the existing site drainage.
- Existing features shall be located and shown within 100' of the project. Existing features to be shown shall include, but may not necessarily be limited to the following items:
 - Ditches.
 - Culverts.
 - Water supply system, storm water management and/or sanitary sewer facilities, including inverts and casting elevations at all structures.
 - Gas, telephone, electric and cable television lines, including manholes and/or utility poles.
 - Pedestrian facilities.
 - Trees and other landmark vegetation.
 - All streams, lakes and/or county drains with names shown.
 - Existing buildings and permanent structures.
- Existing adjacent roads and existing right-of-way or easement lines shall be shown on the plans and shall extend across the entire site with grades shown on both sides of the road for:
 - Right-of-way or easement line.
 - Ditch centerline.
 - Top of bank.
 - Edge of shoulder.
 - Edge of pavement or top of curb.

- Crown or centerline.

Water Supply System

- Water infrastructure improvements specified in the Ypsilanti Community Utilities Authority (YCUA) Water System Master Plan may be required as part of the project. The applicant shall contact the Township Engineer to determine if any improvements called for in the YCUA Water Master Plan will be necessary.
- The minimum size water main allowed for use in the distribution system shall be 8" diameter. Water mains shall be looped. Where dead ends are unavoidable, the following must be met: all mains must end with a gate valve followed by a hydrant. Maximum allowable dead-end main lengths are:
 - 40' for 6" fire hydrant lead.
 - 600' for 8" main.
 - 1,000' for 12" main.
- Show water service and size; no private services allowed from 6" hydrant lead or water mains larger than 16" diameter.
- Where required, a minimum 15' wide easement must be shown on the plans. Where water main is adjacent to and parallel to the right-of-way, a water main easement must be extended across the entire frontage of the property.
- A 10' horizontal separation must be maintained between the water main and sanitary or storm sewers.
- Valve spacing:
 - Three valves to isolate any section of water main, four maximum;
 - No more than 800' of main out of service for 8" water mains, not more than ¼ mile of water main out of service for mains 12" and larger;
 - No more than 2 hydrants out of service;
 - No more than 24 single family units or 30 multiple units out of service;
- For major commercial and industrial developments, building service must be maintained from a looped system with valves located on either side of the building service.
- Fire hydrants shall be located to provide 250-foot radial coverage of all existing and proposed permanent structures.
- No parking within 10' of any hydrants.

Sanitary Sewer

- Sanitary sewer infrastructure improvements specified in the Ypsilanti Community Utilities Authority (YCUA) Sanitary Sewer Master Plan may be required as part of the project. The applicant shall contact the Township Engineer to determine if any improvements called for in the YCUA Sanitary Sewer Master Plan will be necessary.
- Preliminary design calculations shall be provided on the plans.
- Where required, a minimum 25' wide easement must be shown on the plans. For sanitary

sewers proposed to be more than 10' deep the minimum easement width shall be two times the proposed depth.

- Show building lead size and location as well as other proposed sewers.

Storm Water Management Systems

- Preliminary design calculations prepared in accordance with the Rules of the Washtenaw County Drain Commissioner (WCDC) Procedures and Design Criteria for Storm Water Management Systems, latest revision, shall be provided on the plans.
- Restricted discharge rates and/or improvements to downstream drainage courses may be required as prescribed by the Charter Township of Ypsilanti Storm Water Master Plan of 1994. The applicant shall contact the Township Engineer to determine what design criteria specified in the Storm Water Master Plan apply to the proposed project.
- Proposed collection points, system layout, sizes and outlets must be shown on the site plan. Also show preliminary invert elevations and top of casting elevations.
- Where required, a minimum 12' wide easement must be shown on the plans. For storm sewers proposed to be more than 6' deep the minimum easement width shall be two times the proposed depth.
- Alternative means of providing detention are discouraged, but will be considered on a "case by case" basis:
 - Oversized storm pipes.
 - Parking lot storage. When approved, the maximum depth of water stored in parking areas shall be 4".

Paving Improvements

- All roads must conform to the requirements prescribed in the Washtenaw County Road Commission (WCRC) Procedures and Guidelines for Developing Public Roads, latest revision.
- On-site Paving Requirements:
 - Pavement cross-section must be shown in accordance with Township requirements.
 - Bituminous pavements shall have a minimum slope of 1.0% and a maximum slope of 6.0%.
 - Concrete pavements shall have a minimum slope of 0.5% and a maximum slope of 6.0%.
- Minimum drive widths and parking lot dimensions per standard details.
- Sidewalks required along the frontage of all existing and proposed roads.
 - Located 1' inside the ultimate right-of-way line.
 - Barrier free ramps noted.
 - All structures, hydrants, poles, etc. noted and moved or adjusted as necessary.
 - Bike paths may be required in lieu of sidewalks along frontage of major roads.
- Applicable tuning templates shall be provided for the largest delivery vehicle.

Site Grading and Earthwork

- Sufficient proposed grades indicated to ensure that:
 - Drainage is adequately discharged offsite with proper detention.
 - No upstream drainage is restricted.
 - The site in general drains without standing water.
 - Elevation representing the finished grade and the first-floor grade must be indicated. Each elevation shall be clearly labeled as either finished grade or first floor grade.
- Proposed grading shall meet abutting property line elevations. A maximum slope of 1 vertical to 4 horizontal may be employed to meet existing grades at property lines. Grading along existing or proposed property lines shall be in accordance with the Rules of the Washtenaw County Drain Commissioner Procedures and Design Criteria for Storm Water Management Systems, latest revision.
- Easement from adjacent property owner will be required for any grading necessary on offsite property. All offsite easements required to complete the work shall be obtained prior to the start of construction.

Plot Plan Requirements

1. Preliminary Plot Plan

- a. A plot plan drawing shall be filed in accordance with an accurate boundary line survey showing to scale the size and location of all the new construction and all existing structures on the site and distances from lot lines. In addition, all existing significant natural features, including but not necessarily limited to trees and wetlands, as well as existing utilities and other surface features shall be shown on the preliminary plot plan.
- b. The preliminary plot plan shall also show the established street grades, proposed structures, existing structures, sidewalk and easement final grades and elevations at each lot corner and at all other grade change points.
- c. The proposed finish earth grades of the house and the finish earth grades of houses on adjacent lots must be shown.
- d. The ground water surface elevation shall be provided at a location within the proposed building envelope.
- e. All grades are to be in accordance with any subdivision or site condominium plans that have been previously approved for the property. If none are available, the preliminary plot plan will be reviewed using the existing and proposed elevations provided on the plot plan.
- f. Rear yard and side yard drainage swales shall be clearly indicated with grades shown at sufficient locations to provide for positive drainage away from the building and other structures. Channelization of drainage to an approved outlet shall also be shown. Direction arrows shall be provided showing proposed and existing drainage directions.
- g. The Chief Building Official and the Township Engineer are responsible for the review and approval of the preliminary plot plan grades before any building permit may be issued.

2. Building Grade Requirements

Subsequent to the issuance of a building permit and prior to the commencement of construction, the permit holder (or his authorized agent) shall set survey stakes in conformance with the approved plot plan.

3. Final Plot Plan/As-Builts

- a. Upon completion of the site, a final plot plan must be submitted for the site containing the following information:
 - i. The owner's name, address and telephone number
 - ii. The name, address, telephone and fax numbers for the engineer/surveyor.
 - iii. The engineer/surveyor's signature and seal.
- b. The following dimensions must be shown on the plot plan:
 - i. Property lines (all sides) including the bearing.
 - ii. All sides of the building foot-print (including decks).
 - iii. Driveways and sidewalks (label the material used for construction, i.e. – concrete, asphalt, gravel).

- iv. Water, sanitary and storm service leads. Dimension the leads from the building corners; dimension the water shut-off valve from the building corners.
 - v. Any utility facilities on site (utility poles, catch basins, manholes, etc) dimensioned to property lines.
- c. The following as-built elevations, referenced to the benchmarks provided on the approved detailed engineering plan, must be provided on the plot plans:
- i. First floor (basement elevation where a walk out basement is shown); garage floor, porch and/or deck.
 - ii. Lot corners.
 - iii. Ground elevation at the building corners.
 - iv. Centerline of the driveways at no more than 50 feet intervals; culvert crossings; edge of road.
 - v. Centerlines of swales and drainage ditches (at no more than 50' intervals) with high points noted.
 - vi. Inverts of drainage culvert ends; sanitary sewer lead at the property line.
 - vii. Rims of manholes, catch basins, and gate wells/boxes, hydrants and other utility structures.
 - viii. Show and label undisturbed wooded areas, wetlands, flood plains, etc.
 - ix. Note any variances obtained for site with respect to standard setbacks, etc.
4. Grading Certificate
- a. Upon completion of all proposed work shown on the approved plot plan, the permit holder (or his authorized agent) shall submit to the Chief Building Official a grading certificate indicating that all grading has been done and accomplished in accordance with the approved plot plan and the requirements contained herein.
 - b. The certification shall be on a form containing at least the following information when filed:
 - i. Building permit number
 - ii. Date permit was issued
 - iii. Plot plan number
 - iv. Date plot plan was approved by Chief Building Official
 - v. Description of property
 - vi. Date of survey
 - vii. Signature and seal of land surveyor or engineer registered and licensed in the State of Michigan.
 - viii. The grading certificate shall have attached to it a copy of the approved final plot plan with "as-built" elevations shown at grade points.
 - c. Final "as-built" grades shall be in substantial compliance with the approved plot plan with allowable tolerance of plus or minus 0.25 feet.
 - d. No final Certificate of Occupancy will be issued, and no building will be approved for occupancy until:

- i. The property has been graded in strict compliance with the approved plot plan.
 - ii. The grading certificate has been received, field verified and approved by the Chief Building Official.
 - iii. The site has been permanently stabilized in accordance with the Soil Erosion Control section.
- e. A temporary Certificate of Occupancy may be issued by the Chief Building Official upon the posting by the permit holder, or his authorized agent, of a cash bond or an irrevocable letter of credit in the sum of one thousand dollars (\$1,000). The bond will be released upon satisfactory completion of grading and the approval of a grading certificate.

Check List for Detailed Engineering Plans

The following checklist is intended to serve as a guide for designers to review prior to submitting plans to the Township for review. While the checklist covers all major areas that will be reviewed by the Township's Engineer, the list is not all-inclusive, and the Township Engineer may comment on items not listed herein.

General Requirements

- Submittal on 24" x 36" white paper having blue or black lines with a minimum horizontal scale of 1" = 50' and vertical of 1" = 5'. Other acceptable scales are 1" = 20'; 1" = 30' and 1" = 40'.
- General plan at 1" = 100' or 1" = 200' when size of site prohibits a single plan sheet. Show street names, units, utilities, pavement, site dimensions, phase lines, lot lines and lot numbers.
- A location map showing section number(s) and major thoroughfares in the project area shall be provided on the cover sheet of the plans.
- Lot number, parcel dimensions and adjoining rights-of-way shall be shown.
- Township standard notes and details must be attached to the plans. The Standard Notes and Details are included in the Digital Appendix.
- Plans must be signed and sealed by a professional engineer registered in the State of Michigan. All correspondence concerning the design of the site will be directed to the engineer whose seal appears on the plan.
- Name, address and phone number of the applicant and the design engineer must be shown on the plans.
- Legal description of property must be provided on the plans.
- Both existing and proposed utilities must be a minimum of 10' from existing or proposed buildings.
- North arrow, scale, and MISS DIG notice must be shown on the plans.
- The storm sewer, sanitary sewer and water main shall be shown on the same plan view. The landscaping plan shall be overlaid in light scale in for reference; plantings must not interfere with utilities.
- When more than 3 plan sheets are in a set, a cover sheet with an index shall be provided and each plan sheet shall include a title block providing a summary of the information presented on that sheet.
- Adequate space must be provided to allow for turning movements of vehicles including trucks and fire engines per AASHTO guidelines.
- Provide a minimum of 2 benchmarks. The benchmarks must be referenced to the North American Vertical Datum of 1988 (NAVD '88). All benchmark locations shall be clearly indicated on the plans.

Topography

- A complete topographical survey is required for all proposed projects. A metes and bounds legal description of the project site shall be provided on the plans. Property lines shall be indicated by bearing and distance in the plan view. All existing easements shall also be shown on the plan view of the existing conditions.
- A minimum of two benchmarks are required. All benchmarks shall be clearly indicated on the plans. All elevations shall be to North American Vertical Datum 1988 (NAVD-88).
- Existing offsite elevations must be given at a minimum of 50 feet and 100 feet abutting the

entire perimeter of the site. Grades will be indicated at all property corners and along all property lines. On-site, intermittent elevations and/or defined contours (minimum contour interval of 2 feet) are required to establish the existing site drainage.

- Existing features shall be located and shown within 100' of the project. Existing features to be shown shall include, but may not necessarily be limited to the following items:
 - Ditches.
 - Culverts.
 - Water supply system, storm water management and/or sanitary sewer facilities, including inverts and casting elevations at all structures.
 - Gas, telephone, electric and cable television lines, including manholes and/or utility poles.
 - Pedestrian facilities.
 - Trees and other landmark vegetation.
 - All streams, lakes and/or county drains with names shown.
 - Existing buildings and permanent structures.
- Existing adjacent roads and existing right-of-way or easement lines shall be shown on the plans and shall extend across the entire site with grades shown on both sides of the road for:
 - Right-of-way or easement line.
 - Ditch centerline.
 - Top of bank.
 - Edge of shoulder.
 - Edge of pavement or top of curb.
 - Crown or centerline.

Water Supply System

- Water distribution system improvements shall be designed in accordance with the requirements of the Michigan Safe Drinking Water Act, Act 399 of the Public Acts of 1976, as amended; as well as the latest revisions of the standards prescribed by the American Water Works Association (AWWA), the Great Lakes Water Authority (GLWA), and as specified herein.
- Water infrastructure improvements specified in the Ypsilanti Community Utilities Authority (YCUA) Water Master Plan may be required as part of the project. The applicant shall contact the YCUA Engineer to determine if any improvements called for in the YCUA Water System Master Plan will be necessary.
- Plan and profile views shall be provided for all proposed water main including fire hydrant leads. The plan and profile shall be presented on the same plan sheet and shall be vertically oriented.
 - A water main quantity list shall be provided on the cover sheet of the detailed engineering plans. The quantity list shall be delineated by existing or proposed road right-of-way or easement.
 - The following information must be shown in the plan view of the proposed water supply

system improvements:

- Type, class and size of pipe.
- Length between fittings and/or appurtenances.
- Water service locations and sizes.
- Where required, a dedicated water main easement must be shown on the plans. The easement width shall be the greater of the following: Twice the depth of bury plus the pipe diameter plus 2' (rounded to the next largest full foot), or 15'. Where water main is adjacent to and parallel to the right-of-way, a water main easement must be extended across the entire frontage of the property.
- The following information must be shown in the profile view of the proposed water supply system improvements:
 - Type, class and size of pipe.
 - Length between fittings and/or appurtenances.
 - Top of casting elevation on valve wells and/or boxes as well as the finished grade for fire hydrants.
 - Crossing of all existing and proposed utilities, including leads.
 - Granular backfill, trench details, special bedding, bores and/or other special construction methods.
 - Existing and proposed ground elevations.
- Where public water main construction is proposed, the YCUA standard water main detail sheets must accompany the plans. The standard details are included in the Digital Appendix.
- Water Main
 - The minimum size water main allowed for use in the distribution system shall be 8" diameter. Other allowable sizes for use in the distribution system are 12" and 16". A 12" water main may be considered as minimum for internal transmission on industrial sites, major streets, collector streets and elsewhere as design dictates. Water mains larger than 16" in diameter are considered transmission mains.
 - Water supply systems shall be designed to provide service from a double source of supply ("looped main"), or to be provided service by a double source of supply in the future when adjacent properties are developed with the approval of the Township Engineer.
 - Terminal dead end water mains with domestic service connections are discouraged and will not be permitted without the written approval of the Township Engineer. Where terminal dead-end water mains are permitted, a gate valve and fire hydrant shall be provided at the terminus of the main. The following are the maximum allowable lengths for terminal dead-end water mains:
 - 40' for 6" fire hydrant lead.
 - 600' for 8" water distribution mains (residential areas only).
 - 1,000' for 12" and larger water distribution mains.
 - Water main shall be designed and constructed with a minimum 5½' depth of cover over the top of pipe as measured from the proposed final grade. A minimum 18" vertical

clearance shall be maintained between water mains and other underground utilities. Where the vertical alignment of the water main must be deflected in order to achieve the required vertical clearance, the length of the deeper main shall be kept to a minimum and standard 45° bends shall be used to affect the necessary deflection.

- A minimum 10' horizontal separation shall be maintained between water main and sanitary sewers and/or storm sewers. A minimum 5' horizontal separation shall be provided between water mains and other underground utilities and/or structures.

Valves

- Water supply system improvements shall be designed to include adequate valves to properly isolate sections of water main without adversely impacting significant portions of the system. Valves on water mains 16" and smaller shall be gate valves and valves on water mains larger than 16" shall be butterfly valves.

- The connection of proposed water mains to existing water mains shall be accomplished by means of a tapping sleeve and valve unless the connection can be made without interrupting service on the existing water main or if the existing water main is 16" diameter or larger.

- Valves shall be located so that:

- Three valves to isolate any section of water main, four maximum.
- No more than 800' of water main out of service for 8" water mains; not more than ¼ mile of water main out of service for mains 12" and larger.
- No more than 2 fire hydrants out of service.
- No more than 24 single family units or 30 multiple family units out of service.

- Valves shall generally be located such that they will not be in street pavements, sidewalks or driveways.

- All valves shall be installed in a three-piece, adjustable valve box with the following exception. Valves will be installed in gate wells where the valve will be located within existing or proposed pavement, or the valve is located on a water main larger than 16" in diameter, or the valve is part of a tapping valve connecting to a concrete water main requiring the use of a saddle sleeve.

Fire Hydrants

- Generally, fire hydrants shall be spaced such that not more than 250' of fire hose would be required to reach the farthest corner of any proposed building. Spacing of hydrants around multiple, commercial or manufacturing establishments shall be considered on an individual basis and shall be determined by consultation with the Township Engineer and the Township's Fire Marshal.

Domestic Service Connections

- No service connections shall be permitted from 6" fire hydrant leads or transmission mains.

Sanitary Sewer

- Sanitary sewer infrastructure improvements specified in the Ypsilanti Community Utilities Authority (YCUA) Sanitary sewer system improvements shall be designed in accordance with the requirements of Part 41 of Act 451 of the Public Acts of 1994, as amended, the most recent revision of the Recommended Standards for Sewage Works by the Great

Lakes-Upper Mississippi River Board of State Sanitary Engineers (commonly known as the “Ten States Standards”) and as prescribed herein.

- Public sanitary sewers shall be provided where multiple lots or parcels will be served either presently or in the future. Public sanitary sewer system extensions will require the review and approval of the Township Engineer, YCUA and EGLE. Public sanitary sewers are required when two or more connections are made to the same sewer. In most instances, including multiple unit developments, the sewer may have to be public even though the project has one owner. YCUA approval will be required for private services serving more than one building. The extension of the sanitary sewers will generally be required across the entire frontage of the site.
- Sanitary sewer improvements specified in the Ypsilanti Community Utilities Authority (YCUA) Sanitary Sewer Master Plan may be required as part of the project. The applicant shall contact the Township Engineer to determine if any improvements called for in the YCUA Sanitary Sewer Master Plan will be necessary.
- Plan and profile views shall be provided for all proposed sanitary sewer system improvements including force mains. The plan and profile shall be presented on the same plan sheet and shall be vertically oriented.
 - Sanitary sewer design flow computations, the sanitary sewer district map and a sanitary sewer quantity list shall be provided on the cover sheet of the detailed engineering plans. The design flow computations and sanitary sewer district map shall include both current and future service populations and areas. The quantity list shall be delineated by existing or proposed road right-of-way or easement.
 - The following information must be shown in the plan view of the proposed sanitary sewer system improvements:
 - Size, material and type of pipe.
 - Length between structures.
 - Slope of sewer between structures.
 - Where required, a dedicated sanitary sewer easement must be shown on the plans. The sanitary sewer easement width shall be either twice the depth of the pipe plus the diameter of the pipe plus 2' (rounded up to the nearest whole foot), or 25', whichever is greater.
 - Top of casting and invert elevations at each structure.
 - Progressive numbering system on structures.
 - The following information must be shown in the profile view of the proposed sanitary sewer system improvements:
 - Existing and proposed ground elevations.
 - Length, type, class, size and slope of pipe between structures.
 - Top of casting and all sewer inverts at all structures.
 - All utility crossings.
 - Special backfill areas, i.e. sand.
 - Provisions for infiltration testing.
 - Progressive numbering system on structures.

- Adjacent existing or proposed utilities plotted where parallel.
- Where public sewer construction is proposed, the YCUA standard sanitary sewer detail sheets must accompany the plans. The standard details are included in the Digital Appendix.
- Capacity Design
 - Sewer design flow computations shall be submitted to the Township Engineer for approval with a map delineating the area to be serviced. Major roads and natural features (rivers, lakes, streams) shall be included on the map. Present and future development phases with acreages and contributing offsite areas shall be shown with the number of lots included.
 - For design purposes, population in the tributary area shall be based on a minimum of 3½ persons per single family residence, also referred to as an equivalent residential unit (ERU). The basis of design calculations shall include a tabulation of the usage types and the conversion of the various uses into ERUs. The adopted unit factors as included in the YCUA Trunkline and Transmission Line Service Charge ordinance shall be used to convert different usage types to ERUs.
 - Sanitary sewers shall be designed on the basis of an average daily flow of 100 gallons per capita per day. The sanitary sewer capacity shall be designed on a peak design flow using the peaking factor as prescribed by the Ten States Standards.
 - All sanitary sewers shall be designed to provide mean velocities, when flowing full, of not less than 2.0 feet per second, based on Manning's formula using an "n" value of 0.013. The maximum design velocity for sanitary sewers shall be 10.0 feet per second with the pipe flowing full.
 - The minimum size for sanitary sewers shall be 10" diameter, with the terminal run of 10" sewer at a uniform grade of not less than 1.0% between structures. On all other 10" sanitary sewer runs, the minimum grade shall be 0.30% between structures.
- Sanitary Sewer Location
 - Sanitary sewers shall be located to provide unrestricted access for inspection and maintenance operations.
 - A minimum horizontal separation of 10' shall be provided between sanitary sewers and water mains. If it is impossible to obtain proper horizontal and vertical separation as described above, both the water main and sewer must be constructed of slip-on or mechanical joint pipe complying with public water supply design standards of the agency. It must also be pressure tested to 150 psi to assure water-tightness before backfilling. In addition, adequate horizontal separation shall be provided between sanitary sewers and all other underground utilities to allow a 1:1 trench slope from the bottom of the deeper utility, which will not undermine any shallower utility.
- Depth of Sewers
 - The minimum depth of cover over the top of the sanitary sewer pipe shall be 4' as measured from the proposed ground elevation.
 - Sanitary sewers shall be a minimum of 10' deep when fronting residential parcels to be directly connected to the sewer. Deep setbacks or unusual topographic conditions may require more depth.
 - A minimum vertical separation of 18" shall be provided between sanitary sewers and

water mains. In addition, a minimum vertical separation of 12" shall be provided between sanitary sewers and other underground utilities unless otherwise specified by the agency having jurisdiction over the other utility.

Manholes

Manholes shall be installed at intervals not to exceed 300', or at the following locations:

- The upstream terminus of a sanitary sewer run.
- All changes in pipe grade.
- All changes in pipe size.
- All changes in horizontal alignment.
- All sewer junctions.

Manholes for sewers 21" and smaller shall have a minimum diameter of 48". Manholes for sewers larger than 21" shall have a minimum diameter of 60". Larger diameter manholes may be required depending on such factors as the number of sewers at a junction or significant changes in horizontal alignment.

External drop connections will be required where the invert of the outlet sanitary sewer is 18" or more below the inlet pipe invert. Internal drop connections will not be allowed.

The 0.8 depth flow line of sewers shall be matched at structures when changing sizes of sewers.

An allowance of 0.10' in grade shall be made for loss of head through a manhole where sewer alignment is deflected 30° or more.

Building Sewers

Building sewers included with sewer construction.

- For each parcel along the route of a sanitary sewer, a building lead shall be constructed from the sanitary sewer to a minimum of 10' beyond the property line. This applies to any parcels in the sanitary sewer service design area.

The minimum grade for building sewers shall be 1% for 6" sewers and 2% for 4" sewers.

Storm Water Management Systems

Storm water management systems shall be designed in accordance with the Rules of the Washtenaw County Water Resources Commissioner (WCWRC) Procedures and Design Criteria for Storm Water Management Systems, latest revision. Projects in the following watersheds will require the review of EGLE due to thermal/environmental sensitivity: Chicking Ditch and Paint Creek watersheds.

Restricted discharge rates and/or improvements to downstream drainage courses may be required as prescribed by the Charter Township of Ypsilanti Storm Water Master Plan of 1994. The applicant shall contact the Township Engineer to determine what design criteria specified in the Storm Water Master Plan apply to the proposed project.

Where an approved point of discharge is not available on the site, the applicant shall make such offsite drainage improvements as are necessary to provide positive drainage to an approved outlet, as determined by the Township Engineer and/or the WCWRC. Such improvements shall be located in an easement secured by the applicant. The easement form and width of the easement shall be subject to Township approval.

Plan and profile views shall be provided for all proposed storm water management system

improvements. The plan and profile shall be presented on the same plan sheet and shall be vertically oriented.

- Design calculations for all components of storm water management systems, including but not necessarily limited to storm sewers, channels and detention facilities, shall be provided on the plans.
- A drainage area map shall be included on the plans. The map shall define the areas tributary to catch basins and inlets (including upstream and offsite areas). The design calculations shall include the determination of the weighted runoff coefficients for the areas tributary to each specific inlet or outlet. The design calculations shall also include justification for the initial time of concentration used for the storm sewer design calculations.
- The following information must be shown in the plan view of the proposed storm sewer system improvements:
 - Size, material and type of pipe.
 - Length between structures.
 - Slope of sewer between structures.
 - Where required, a dedicated storm water easement must be shown on the plans. The easement width shall be in accordance with the following:
 - 12' for open drainage along rear and side property lines.
 - A minimum of 20' for enclosed storm drains.
 - A minimum of 30' for open swales (cross lot drainage).
 - Top of casting and all invert elevations at each structure.
 - Progressive numbering system on structures.
- The following information must be shown in the profile view of the proposed storm sewer system improvements:
 - Existing and proposed ground elevations.
 - Size, material and type of pipe.
 - Length between structures.
 - Slope of sewer between structures.
 - Hydraulic gradient between structures.
 - Top of casting and all invert elevations at each structure.
 - All utility crossings.
 - Special backfill areas, i.e. sand.
 - Progressive numbering system.
 - Adjacent existing or proposed utilities plotted where parallel.
- Where public sewer construction is proposed, the Charter Township of Ypsilanti standard storm sewer detail sheets must accompany the plans. The standard details

are included in the Digital Appendix.

- Components of storm water management systems shall be designed in accordance with the requirements of the WCWRC, as noted previously. The WCWRC design criteria shall apply to all storm water management system components, regardless of whether the facilities will be publicly dedicated or privately maintained at the completion of the project.

Paving Improvements

- All roads proposed for construction in Ypsilanti Township shall be public roads under the jurisdiction of the Washtenaw County Road Commission (WCRC) unless otherwise permitted by Township ordinance. Plans for such roads and/or accompanying sidewalks / bike paths shall be prepared in accordance with WCRC "Procedures and Guidelines For Developing Public Roads", latest revision. In addition to any submittals required for WCRC approval, plans shall also be submitted to the Charter Township of Ypsilanti for review of the proposed road improvements in relation to other existing and proposed facilities. The applicant shall submit three sets of WCRC approved paving plans to the Township upon County approval.
- Paving improvements for parking lots, internal roads and pedestrian facilities on private sites shall be designed in accordance with the requirements prescribed herein.
- Concrete curb and gutter will be required for all private roadway construction and parking lot construction with the following exceptions:
 - Large lots of one acre or more for residential detached housing.
 - Industrial storage yards not used for regular road vehicle parking.
 - Bituminous curb may be substituted for concrete curb and gutter in commercial parking lot construction.
- Underground storm sewers, including edge drains for parking lots and roads, shall be designed and installed with all paving improvements which require concrete curb and gutter or asphalt curb. Where pavements are to be constructed over clay soils or other poorly drained soils and a granular subbase is used, an approved sub-drainage system shall be installed.
- Plan and profile views shall be provided for all proposed paving improvements. The plan and profile shall be presented on the same plan sheet and shall be vertically aligned. If possible, storm water management improvements shall be shown on the same plan sheet as the paving improvements.
 - The plans shall include typical cross section(s) showing dimensions, materials, type and thickness of the proposed paving improvements.
 - The following information shall be shown in the plan view of the proposed paving improvements.
 - Existing right-of-way or road easement as well as the proposed right-of-way or road easement. A minimum 12 foot wide easement for private utilities shall be provided adjacent to each side of the proposed right-of-way or road easement.
 - Centerline alignment, including curve data, stationing, edge of pavement and/or curb. Centerline and stationing are not required for parking lots.
 - Location of existing and proposed topographic features, including utilities.
 - Location of existing and proposed traffic control devices.
 - Location of existing and proposed street-light poles.

- Location of all proposed pedestrian facilities. Bike paths may be required by the Township in lieu of sidewalks.
- The following information shall be shown in the profile view of the proposed paving improvements. Profiles are not required for proposed parking lots.
 - Existing and proposed ground at the centerline (for rural roads) or top of curb (for urban roads).
 - Percent of grade and vertical curve data.
- Cross Sections
 - Dimensional widths and thickness of materials and associated road features shall be designed in accordance with the typical road cross sections prescribed by the WCRC. For public roads, the cross-section requirements will be based on the functional class of the road as designated by the WCRC.
 - For parking lots and internal roads at nonresidential sites, the cross-section requirements will be based on the functional class of the public road serving the property. The minimum width for an internal drive shall be 26' measured from the back-of-curb to back-of-curb or edge of pavement to edge of pavement for non-curbed internal roads.
 - Pedestrian facilities shall be designed in accordance with the requirements prescribed by the WCRC.
- Horizontal Alignment
 - Horizontal alignment of pavement and associated road features shall be designed in accordance with the requirements prescribed by the WCRC.
 - Pedestrian facilities shall generally be located outside the right-of-way in a dedicated easement. Pedestrian facilities will be located within the right-of-way with the permission of the WCRC. The horizontal alignment of pedestrian facilities shall be as close to parallel as practical to the right-of-way or easement.
- Vertical Alignment
 - The vertical alignment of all public roads, internal roads and parking lots shall be designed in accordance with the requirements prescribed by the WCRC.

Site Grading and Earthwork

- All proposed developments should be graded such that storm water runoff will be intercepted within the boundaries of the site and conducted through a storm sewer system to an approved point of discharge.
- Easements for surface drainage shall be dedicated and recorded.
- For perimeter lots, the drainage easement width shall be 20' minimum, and for abutting lots with a common rear yard lot line, the easement width shall be at least 10' on each lot.
- The following information must be shown in the plan view of the proposed grading:
 - Grading plans shall be drawn to a scale of 1" = 50' or larger.
 - The grading plans shall show the existing elevation topography either by contour method or grade point grid method.
 - High and low street grade points, slope direction (by arrow) and the location of all catch

basins, inlets and drainage ditches shall be shown on the grading plan.

- A detail of the typical lot drainage pattern shall be shown on the grading plan with all grade control points identified. All grade point elevations shall be shown for each lot which includes the first floor (F.F.), or the foundation grade (F.G.) elevations, high point (grade break), drainage arrows and additional spot elevations to clarify site grading.

Soil Erosion & Sedimentation Control

- Soil erosion and sedimentation control measures shall be incorporated into the design and construction of all projects as specified by Chapter 24, Article VI – “Erosion Control”, of the Charter Township of Ypsilanti Code of Ordinances, as amended. All projects shall be designed and constructed to minimize soil erosion and sedimentation impacts to the environment.
- All proposed temporary and permanent soil erosion and sedimentation control measures shall be shown on the plans. All soil erosion control measures shall be identified in accordance with the Michigan Unified Keying System.

Check List for Soil Erosion and Sedimentation Control Plans

The following checklist is intended to serve as a guide for designers to review prior to submitting plans to the Township for review. While the checklist covers all major areas that will be reviewed by the Township's Engineer, the list is not all-inclusive, and the Township Engineer or Township Reviewer may comment on items not listed herein.

- The principles and practices of proper soil erosion and sediment control are effectively utilized with the proposed plan.
- The soil erosion and sediment control plan is an independent plan sheet that clearly shows all soil erosion and sediment control measures.
- Contact information for the landowner, developer, and petitioner is provided.
- Legal description and boundary line survey of the site on which the work is to be performed.
- Vicinity map showing the adjacent properties within 500' of the site.
- Plans are drawn at a scale that is standard for engineering drawings.
- Topography map with existing contours, shown at maximum one-foot intervals, that accurately shows existing natural drainage patterns.
- A description of soils located on-site as defined by the Hydrological Soil Groups for Washtenaw County. A more detailed soil investigation report may be required by the Community and Economic Development Department.
- The location of any structure located on-site or within 50' of the site boundary line.
- Location of all existing and proposed on-site drainage facilities, including ditches, catch basins, and detention/retention facilities.
- An outline of all existing natural woodland features located on-site, with an indication of whether these natural features are to be protected or removed during the construction process.
- All lakes, streams, wetlands, and county regulated drains within 500' of any earth changes clearly shown and identified on the plans.
- Drainage arrows and proposed contours showing the drainage patterns for the proposed earth disturbance.
- Identification of the ultimate drainage outlet.
- A map showing the total drainage area and calculations providing the estimated runoff to be generated by the site.
- The location and limits of all proposed earth disturbances and soil stock piles.
- Location and type of all proposed erosion and sediment control measures shown graphically on the plans.
- Location of all existing and proposed on-site drainage facilities, including ditches, catch basins, and detention/retention facilities.
- Construction and installation details of all erosion and sediment control items.
- The scheduling and sequencing of all construction activities and soil erosion control measures for the project.
- A maintenance agreement, which includes maintenance tasks, budget, and schedules, for all permanent erosion and sediment control items. The person(s) or organization responsible for the maintenance program shall be included.



JOB NAME: _____ REVIEWED BY: _____

JOB NUMBER: _____ DATE REVIEWED: _____

YPSILANTI TOWNSHIP RECORD PLAN REQUIREMENT CHECKLIST

Print Date: _____

This checklist should be completed, signed & sealed and submitted along with the Record Drawings.

Note: Tie down measurements and top of casting elevations to all utility structures or building corners will also be the responsibility of the engineer providing the record drawings.
The use of coordinates alone to locate structures is not acceptable.

The Orchard, Hiltz & McCliment, Inc project number must be printed in the lower right hand corner of all plan sheets.

SANITARY SEWER

I. PLAN VIEW

- | | [NEED] | [O.K.] | |
|----|--------|--------|---|
| A. | [] | [] | Lengths between manholes |
| B. | [] | [] | Size of pipe |
| C. | [] | [] | Length & Location of casing pipe |
| D. | [] | [] | Ties to manholes |
| E. | [] | [] | Type & class of pipe & joint ("O" ring, slip, solvent weld, etc.) |
| F. | [] | [] | T/casting grades |
| G. | [] | [] | Ties to wye locations |
| H. | [] | [] | Permit numbers (County & EGLE) |
| I. | [] | [] | Manhole numbering (sequential) |
| J. | [] | [] | Show all sanitary sewer easements on plans |
| K. | [] | [] | Provide copies of all sanitary sewer easements |

II. PROFILE VIEW (REQUIRED FOR ALL PIPES)

- | | [NEED] | [O.K.] | |
|----|--------|--------|---|
| A. | [] | [] | Lengths between manholes |
| B. | [] | [] | Size of pipe |
| C. | [] | [] | Lengths of casing pipe |
| D. | [] | [] | Depth of wye & riser |
| E. | [] | [] | Invert grades |
| F. | [] | [] | Type & class of pipe & joint ("O" ring, slip, solvent weld, etc.) |
| G. | [] | [] | T/casting grades |
| H. | [] | [] | Wye locations (tied to permanent structures, property corners) |
| I. | [] | [] | Percent slope between manholes |
| J. | [] | [] | Manhole numbering (sequential) |

STORM SEWER

I. PLAN VIEW

	[NEED]	[O.K.]	
A.	[]	[]	Lengths between manholes/catch basins/inlets
B.	[]	[]	Size of pipe
C.	[]	[]	Ties to manholes/catch basins/inlets
D.	[]	[]	Type & class of pipe & joint
E.	[]	[]	T/casting grades
F.	[]	[]	Structure numbering (sequential)
G.	[]	[]	Special structures (low head, 5' dia., 6' dia., 2' sump, etc.)
H.	[]	[]	Show all easements for storm sewer on plans
I.	[]	[]	Provide copies of all storm sewer easements

II. PROFILE VIEW (REQUIRED FOR PIPE 12" & LARGER)

	[NEED]	[O.K.]	
A.	[]	[]	Lengths between manholes
B.	[]	[]	Size of pipe
C.	[]	[]	Type & class of pipe & joint
D.	[]	[]	Invert grades
E.	[]	[]	T/casting grades
F.	[]	[]	Structure numbering (sequential)
G.	[]	[]	Percent slope between manholes

WATER MAIN

I. PLAN VIEW

	[NEED]	[O.K.]	
A.	[]	[]	Lengths between gate valve & wells, hydrants and fittings
B.	[]	[]	Size of pipe
C.	[]	[]	Ties to gate valve & wells, hydrants and fittings
D.	[]	[]	Ties to hydrants
E.	[]	[]	Ties to stop boxes
F.	[]	[]	Ties to building or offsets to pipe
G.	[]	[]	Offset of pipe from building/property line (if parallel).
H.	[]	[]	Type and class of pipe
I.	[]	[]	Finish grade of hydrants
J.	[]	[]	T/Casting grades
K.	[]	[]	Horizontal bend locations
L.	[]	[]	Location of thrust blocks & types of restraints
M.	[]	[]	Sequentially numbered G.V.W. & Valve Boxes
N.	[]	[]	Permit numbers (County & EGLE)
O.	[]	[]	Manufacturer of hydrant
P.	[]	[]	Show all water main easements on plan
Q.	[]	[]	Provide copies of all water main easements

WATER MAIN (continued)

II. PROFILE VIEW

	[NEED]	[O.K.]	
A.	[]	[]	Size of pipe
B.	[]	[]	Type and class of pipe
C.	[]	[]	G.V & Valve Box location
D.	[]	[]	Hydrant location (identify special structures such as blow off)
E.	[]	[]	Air relief valves/blow off valve locations
F.	[]	[]	Vertical bend locations

PAVEMENT

I. Width and station of pavement (measured from centerline)

	[NEED]	[O.K.]	
A.	[]	[]	At end of radius at intersection
B.	[]	[]	At beginning of taper
C.	[]	[]	At end of taper
D.	[]	[]	Any changes in alignment
E.	[]	[]	Radius @ intersection
F.	[]	[]	Right-of-way survey data

II. Drives

	[NEED]	[O.K.]	
A.	[]	[]	location
B.	[]	[]	Width
C.	[]	[]	Radius

III. Sidewalk

	[NEED]	[O.K.]	
A.	[]	[]	Location
B.	[]	[]	Width/Material
C.	[]	[]	Changes in alignment
D.	[]	[]	Ramps per ADA requirements
E.	[]	[]	Provide original recorded copies of all easements for bike path and/or sidewalk

GRADING

	[NEED]	[O.K.]	
A.	[]	[]	Slopes of swales/ditches field verified (50' centerline spot elevations)
B.	[]	[]	Detention basin sized/located according to approved plan (field verified)
C.	[]	[]	Side slopes of pond/berms field verified
D.	[]	[]	Provide original recorded copies of all easements for grading & drainage

DIGITAL VERIFICATION

	[NEED]	[O.K.]	
A.	[]	[]	PDF's of all applicable Plan Sheets
B.	[]	[]	AutoCAD version of Construction Drawings with xref files
C.	[]	[]	DWG Base File in State Plane Coordinates

Revisions Needed

No Revisions Needed

A Guide for Structure Reviews

In an effort to develop consistent and uniform criteria for structural reviews for private developments and site plans for municipal clients, we have developed the following submittal guidelines. Generally, the review will be based on the following information, however additional data, calculations, and information may be requested to provide for a more extensive review. Any missing items may be grounds for a request for re-submittal.

Contract construction drawings (24" x 36") bearing the seal and signature of an engineer licensed in the state of Michigan shall be submitted to the Municipality/City/Village, etc. The name of the person/company responsible for the project and the estimate of cost for the structure should accompany the plan. The construction documents, as a minimum, shall have the following data noted or referenced on the drawings:

Concrete Walls/Structures

- Clearly identified location of structure in site (plan view) with a location map (200 scale or equivalent)
- Top and bottom of wall elevation (plan view)
- Finished grades adjacent to the structure
- Grading plan corresponds to proposed structure
- Minimum and maximum wall height (cross section)
- Notes identifying or referencing material types and specifications
- Design loads including vehicular impact and surcharge loadings where applicable
- Structural dimensions and footing depth
- Wall and footing thickness
- Steel (reinforcing) grade, cover and spacing
- Bearing pressures (noted or referenced) and soil bearing capacities

- Openings in walls
- Protective guard requirements (required within two feet of pedestrians)
- Drainage requirements
- Filter wrapped drain tile and outlets specified
- Utility conflicts – noted with owner contact information
- Soil boring information & Geotechnical analysis

Block & Timber Retaining Walls

- All of the above except steel reinforcing data
- Segmental wall dimensions and soil reinforcing (if applicable)
- Manufacturer specifications (Block only) – compare to plans
- Geo-grid length noted, dimensioned and labeled on plans
- Embedment depth
- Boulder wall not exceeding four feet in height

In all cases, a signed and sealed letter from the engineer of record certifying that structures have been designed in accordance with applicable structural design codes with the codes identified; that all applicable safety factors, standards and codes (identify safety factors) have been met or exceeded; and that the soil conditions have been reviewed by a qualified geotechnical engineer.

Appendix B

B-1: Standard Detail Sheets

B-2: Sample CAD Layering File

**Ypsilanti Community Utilities Authority
Standards
For submitting
Digital Record Drawings**



Prepared by Orchard, Hiltz & McCliment, Inc.

The following digital submission specifications are being provided as minimum requirements and guidelines for consultants and developers reference. Should you have any questions or comments please contact your community representative.

A. Digital format of CAD files

The acceptable digital format for record drawing files shall be in AutoCAD format according to the following specifications:

- AutoCAD version 2015 or later
- Layer naming (shown in Table A) is to remain unaltered
- All polygons must be closed
- Lines shall not be unnecessarily segmented
- Intersecting lines segments must have common end points

B. Layering scheme

Key mapping features shall be stored on unique CAD layers. Related text shall be included with each layer (i.e., storm pipes on a single layer and storm pipe annotation on a separate single layer). See “Table A” for layer names and descriptions. Submitted drawings will go through a quality check and the layers will be verified. Drawings found not to comply will be modified by the Township, YCUA or the Township’s engineer to bring them in compliance with the layering standards. Any submittals requiring modification will result in an additional fee to the applicant. Submittals needing substantial modifications will result in the rejection of the digital file.

C. Coordinate System

All drawings shall contain adequate geodetic reference to Michigan South State Plane NAD 83. Units must be described as being international feet.

Drawings will conform to having one of the following references:

- (a) A drawing will reference a section corner/quarter-corner with distance and bearing data relating this point to the site plan.
- (b) A minimum of two (2) drawing locations will be identified with NAD83 coordinates established by field survey techniques (i.e., GPS or total station). Geographic coordinates shall appear in the drawing as text of a readable size and shall be in either Michigan South State Plane NAD83 or Geographic coordinates of sufficient resolution to derive state-plane coordinates within 1/10 of a foot.

D. Media for delivery

File transfer media shall be one of the following options:

- CDROM, CD-R or DVD
- Electronic (Internet) file transfer, FTP or email

CADD/GIS Standard Naming Convention

Description	Layer name
Annotations	
all chart lines and text*	a_chart
day stamp	a_daystamp
all legend lines*	a_legend
all location map lines and text*	a_locmap
match line	a_matchline
match line text	a_matchline_txt
north arrow	a_north
drawing notes in layout	a_note
graphic scale	a_scale
street name (major)	a_street_maj
street name (minor)	a_street_min
all titleblock lines*	a_tblk
*The colors and linetypes for these layers are set by property	

Description	Layer name
Utilities	
cable lines	e_cable
cable point	e_cable_pt
cable symbol	e_cable_sym
cable text	e_cable_txt
electric utility lines	e_elec
point layer for electric symbols	e_elec_pt
electric utility symbols	e_elec_sym
electric utility text	e_elec_txt
existing force main lines	e_fm
existing force main point	e_fm_pt
existing force main symbol	e_fm_sym
existing force main text	e_fm_txt
gas utility lines	e_gas
point layer for gas symbols	e_gas_pt
gas utility symbols	e_gas_sym
gas utility text	e_gas_txt
sanitary utility lines	e_san
point layer for sanitary symbols	e_san_pt
sanitary symbols	e_san_sym
sanitary utility text	e_san_txt
storm utility lines	e_stm

point layer for storm symbols	e_stm_pt
storm symbols	e_stm_sym
storm utility text	e_stm_txt
telephone lines	e_tel
point layer for telephone symbols	e_tel_pt
telephone symbols	e_tel_sym
telephone utility text	e_tel_txt
misc. utility lines	e_util
point layer for misc. utility symbols	e_util_pt
misc. utility symbols	e_util_sym
misc. utility text	e_util_txt
water main utility lines	e_wm
point layer for water main structure symbols	e_wm_pt
water main structure symbols	e_wm_sym
water main text	e_wm_txt
proposed cable lines	p_cable
proposed cable symbol	p_cable_sym
proposed cable text	p_cable_txt
proposed electric lines	p_elec
proposed electric symbol	p_elec_sym
proposed electric text	p_elec_txt
proposed force main	p_fm
proposed force main text	p_fm_txt
proposed gas lines	p_gas
proposed gas symbol	p_gas_sym
proposed gas text	p_gas_txt
proposed jack & bore	p_jbore
proposed jack & bore text	p_jbore_txt
proposed sanitary	p_san
proposed sanitary symbol	p_san_sym
proposed sanitary text	p_san_txt
proposed storm	p_stm
proposed storm text	p_stm_txt
proposed storm symbol	p_stm_sym
proposed structure text	p_*str_txt
proposed telephone lines	p_tel
proposed telephone symbol	p_tel_sym
proposed telephone text	p_tel_txt
proposed underdrain	p_udrain
proposed underdrain text	p_udrain_txt
proposed water main	p_wm
proposed water main symbol	p_wm_sym
proposed water main text	p_wm_txt
*insert the utility name here (stm, san, wm etc)	

Miscellaneous

existing dimensions	e_dim
layers to be frozen	freeze
hatch boundaries	hatch_bound
proposed building dimension	p_bldg_dim
proposed building	p_bldg
proposed building hatch	p_bldg_hatch
proposed building text	p_bldg_txt
proposed major contours	p_conmaj
proposed minor contours	p_conmin
proposed contour text	p_cont_txt
proposed dimensions	p_dim
point layer for proposed grades	p_grade_pt
proposed elevations	p_grade_txt
proposed grading limit line	p_gradlmt
proposed grading limit dimension	p_gradlmt_dim
proposed grading limit text	p_gradlmt_txt
proposed guardrail	p_grail
proposed parking lot text	p_park_txt
proposed signs	p_sign_sym
proposed tree symbol	p_tree_sym
proposed wall	p_wall
soil boring symbol	sb_sym
soil boring text	sb_txt
viewports	vp

Description**Layer name****Drainage**

drainage arrows	p_drain_sym
proposed ditch	p_ditch
proposed ditch text	p_ditch_txt
proposed drainage area text	p_drainage_txt
erosion control structures (inlet filter)	p_eroctrl_sym
erosion control text	p_eroctrl_txt
proposed silt fence	p_silt
drainage area boundaries	p_drainage

Description**Layer name****Profiles**

existing centerline of structures	e_prf_cl
-----------------------------------	----------

existing ground center	e_prf_grndc
existing ground center elevations	e_prf_grndc_txt
existing ground left	e_prf_grndl
existing ground left elevations	e_prf_grndl_txt
existing ground right	e_prf_grndr
existing ground right elevations	e_prf_grndr_txt
existing sanitary	e_prf_san
existing sanitary structure	e_prf_san_sym
existing sanitary text	e_prf_san_txt
existing storm	e_prf_stm
existing storm structure	e_prf_stm_sym
existing storm text	e_prf_stm_txt
existing text	e_prf_txt
existing water main	e_prf_wm
existing water main structures	e_prf_wm_sym
existing water main text	e_prf_wm_txt
proposed centerline of structures	p_prf_cl
proposed ditch text	p_prf_ditch_txt
proposed ditch, left	p_prf_ditchl
proposed ditch, right	p_prf_ditchr
proposed ground center	p_prf_grndc
proposed ground center text	p_prf_grndc_txt
proposed ground left	p_prf_grndl
proposed ground left text	p_prf_grndl_txt
proposed ground right	p_prf_grndr
proposed ground right text	p_prf_grndr_txt
proposed sanitary	p_prf_san
proposed sanitary structure	p_prf_san_sym
proposed sanitary text	p_prf_san_txt
proposed storm	p_prf_stm
proposed storm structure	p_prf_stm_sym
proposed storm text	p_prf_stm_txt
proposed structure labels	p_prf_str_txt
proposed text	p_prf_txt
proposed water main	p_prf_wm
proposed water main structure	p_prf_wm_sym
proposed water main text	p_prf_wm_txt
grid base	prf_base
grid elevations	prf_elev
profile grid lines	prf_grid
grid stations	prf_sta

Description

Layer name

Existing topography

building lines

e_bld

building hatch	e_bld_hatch
existing building point	e_bld_pt
building text	e_bld_txt
existing building dimension	e_bld_dim
road centerline	e_cl
existing centerline point	e_cl_pt
existing contours (major)	e_conmaj
existing contours (minor)	e_conmin
point layer for cultural symbols	e_cult_pt
cultural symbols (e.g. mailboxes)	e_cult_sym
auto offset text	e_cult_txt
existing culvert	e_culv
existing culvert point	e_culv_pt
existing culvert symbol	e_culv_sym
curb	e_curb
existing curb point	e_curb_pt
ditch centerline	e_ditch
existing ditch point	e_ditch_pt
driveways	e_dw
existing driveway point	e_dw_pt
edge of asphalt	e_eoa
existing asphalt hatch	e_eoa_hatch
existing edge of asphalt point	e_eoa_pt
existing edge of brick	e_eobr
existing edge of brick point	e_eobr_pt
existing brick hatch	e_eobr_hatch
edge of concrete	e_eoc
existing concrete hatch	e_eoc_hatch
existing edge of concrete point	e_eoc_pt
edge of gravel	e_eog
existing gravel hatch	e_eog_hatch
existing edge of gravel point	e_eog_pt
existing edge of other	e_eoo
existing edge of other hatch	e_eoo_hatch
existing edge of other point	e_eoo_pt
fence lines	e_fence
existing fence point	e_fence_pt
fence symbols	e_fence_sym
existing face of curb	e_foc
guardrail lines	e_grail
existing guardrail point	e_grail_pt
guardrail symbol	e_grail_sym
existing pavement marking	e_pm
point layer for rock symbols	e_rock_pt
rock symbol	e_rock_sym
existing railroad line	e_rr
existing railroad point	e_rr_pt
existing railroad symbol	e_rr_sym

road shoulder	e_shldr
road shoulder point	e_shldr_pt
shrub line	e_shrub
point layer for shrub symbols	e_shrub_pt
shrub symbols	e_shrub_sym
point layer for sign symbols	e_sign_pt
sign symbols	e_sign_sym
top and bottom of banks or slopes	e_topo
point layer for e_topo	e_topo_pt
annotations (e.g. conc., edge/asph. Etc.)	e_topo_txt
tree lines	e_tree
point layer for tree symbols	e_tree_pt
tree symbols	e_tree_sym
existing landscaping or planted areas	e_veg
existing vegetation point	e_veg_pt
sidewalk	e_walk
existing sidewalk hatch	e_walk_hatch
existing sidewalk point	e_walk_pt
wall	e_wall
existing wall text	e_wall_pt
existing wetland	e_wtlnd
existing wetland hatch	e_wtlnd_hatch
existing wetland point	e_wtlnd_pt
edge of water	e_wtr
existing water hatch	e_wtr_hatch
existing edge of water point	e_wtr_pt

Description

Layer name

Proposed design

proposed asphalt	p_eoa
proposed back of curb	p_boc
proposed road centerline	p_cl
proposed concrete	p_eoc
proposed face of curb	p_foc
proposed shoulder	p_eos
proposed walk	p_walk

Description

Layer name

Staging

proposed stage lines	p_stage
proposed staging dimensions	p_stage_dim
proposed staging hatch	p_stage_hatch

stage symbols (signs, arrows, barrels etc.)
proposed staging text
Note: for multiple stages add 1, 1a, 2, 2a etc
I.e. p_stage1a p_stage2 etc.

p_stage_sym
p_stage_txt

Description

Layer name

PMS

proposed pavement markings
proposed pavement marking dimensions
proposed pavement marking symbols
proposed pavement marking text
proposed sign symbol
proposed sign text

p_pm
p_pm_dim
p_pm_sym
p_pm_txt
p_sign_sym
p_sign_txt

Description

Layer name

Removal

proposed removal lines
proposed removal hatch
proposed removal symbols
proposed removal text

p_rem
p_rem_hatch
p_rem_sym
p_rem_txt

Description

Layer name

Details

existing or lightweight object lines
interior medium weight object lines
heavy object lines
detail center lines
existing detail dimensions
existing detail text
hidden object lines
detail notes
proposed detail dimensions
proposed detail text
detail subtitle
detail title
detail hatch
detail section lines

d_det_1
d_det_3
d_det_5
d_det_cen
d_det_edim
d_det_ext
d_det_hid
d_det_notes
d_det_pdim
d_det_ptxt
d_det_sub
d_det_title
d_det_hatch
d_det_sec

Description**Survey**

Description	Layer name
aerial control points	e_actrl
aerial control text	e_ctrl_txt
point layer for benchmarks	e_bm_pt
benchmark symbols	e_bm_sym
benchmark text	e_bm_txt
existing boundary line	e_bndy
existing boundary dimension	e_bndy_dim
existing boundary point	e_bndy_pt
existing boundary symbol	e_bndy_sym
existing boundary text	e_bndy_txt
existing bridge line	e_brg
existing bridge hatch	e_brg_hatch
existing bridge point	e_brg_pt
control:traverse & benchmark lines	e_ctrl
control:traverse & benchmark points	e_ctrl_pt
control:traverse & benchmarks symbols	e_ctrl_sym
control:traverse & benchmarks text	e_ctrl_txt
existing easement	e_esmt
existing easement dimensions	e_esmt_dim
existing easement text	e_esmt_txt
existing road easement	e_esmtrd
existing road easement dimension	e_esmtrd_dim
existing road easement text	e_esmtrd_txt
existing sanitary easement	e_esmts
existing sanitary easement dimension	e_esmts_dim
existing sanitary easement text	e_esmts_txt
existing storm easement	e_esmtstm
existing storm easement dimension	e_esmtstm_dim
existing storm easement text	e_esmtstm_txt
existing water easement	e_esmtwm
existing water easement dimension	e_esmtwm_dim
existing water easement text	e_esmtwm_txt
existing lots	e_lot
existing lot dimension	e_lot_dim
existing lot text	e_lot_txt
point layer for monument symbols	e_mon_pt
monument symbols	e_mon_sym
monument text	e_mon_txt
existing property iron symbol	e_prir_sym
existing property iron text	e_prir_txt
section lines	e_secline
existing row dimension	e_row_dim
existing row text	e_row_txt
section line text	e_secline_txt

existing row	e_row
existing setback line	e_setbk
	e_setbk_dim
existing setback dimension	
existing setbk text	e_setbk_txt
proposed boundary line	p_bndy
proposed boundary dimension	p_bndy_dim
proposed boundary text	p_bndy_txt
proposed easement	p_esmt
proposed easement text	p_esmt_txt
proposed grading easement	p_esmtgrad
proposed grading easement dimension	p_esmtgrad_dim
proposed grading easement text	p_esmtgrad_txt
proposed road easement	p_esmtrd
proposed road easement text	p_esmtrd_txt
proposed sanitary easement	p_esmtsan
proposed sanitary easement text	p_esmtsan_txt
proposed storm easement	p_esmtstm
proposed storm easement text	p_esmtstm_txt
proposed temporary grading easement	p_esmttemgrad
proposed temp grading easement dimension	p_esmttemgrad_dim
proposed temp grading easement text	p_esmttemgrad_txt
proposed water easement	p_esmtwm
proposed water easement text	p_esmtwm_txt
proposed lot line	p_lot
proposed lot dimension	p_lot_dim
proposed lot text	p_lot_txt
proposed property iron	p_prir_sym
proposed property iron text	p_prir_txt
proposed row	p_row
proposed row dimension	p_row_dim
proposed row text	p_row_txt
proposed setback	p_setbk
proposed setback dimension	p_setbk_dim
proposed setback text	p_setbk_txt

Appendix C

Detailed Engineering Submittal Form

Charter Township of Ypsilanti
Detailed Engineering Review Application

Site Name:	OHM Job Number: (for OHM use)		
Zoning:	Parcel ID:		
Date Approved by Planning Commission:			
Applicant:	Phone: ()	Fax: ()	
Address:	City:	State:	Zip:
Design Engineer:	Phone: ()	Fax: ()	
Address:	City:	State:	Zip:

Proposed Site Improvements:

Water Main No Yes If yes, _____ feet of _____ inch water main and a total of _____ water services.

Sanitary Sewer No Yes If yes, _____ feet of _____ inch sanitary sewer and a total of _____ leads.

Storm Sewer No Yes If yes, _____ feet of storm pipe with detention facilities designed to detain _____ cubic feet of runoff.

Other Items:

Storm Water Discharge Location: _____

Total area of disturbance: _____ acres

Project Estimate: The applicant shall submit a complete preliminary engineer’s estimate including quantity, unit cost and total costs for each individual item (e.g. 8-inch ductile iron water main, 4-foot diameter manhole, etc.). The unit costs shall include the cost of labor and materials for each item. A sample of this estimate can be found attached to this document. A summary of the division costs calculated by the design engineer shall be completed on this form. These prices will be used in development of bonding requirements that will be delivered to the applicant upon receiving engineering plan approval.

The Detailed Engineering Review Application and a detailed engineering estimate must be approved by Orchard Hiltz & McCliment prior to submitting plans and their associated fees to the Township Community & Economic Development Department. Estimates and this application can be e-mailed to matt.parks@ohm-advisors.com or jessica.howard@ohm-advisors.com.

Division	Total Cost
Site Grading	\$
Sidewalks & Bike Paths	\$
Storm Sewer	\$
Water Main	\$
Sanitary Sewer	\$
Landscaping	\$
Soil Erosion and Sedimentation Control	\$

TOTAL PRELIMINARY PROJECT COST	\$
---------------------------------------	-----------

Estimate Prepared by: _____ P.E.

<i>Seal of Professional Engineer Registered to practice in the Station Of Michigan</i>

Sample Project Estimate*

Site Grading/Sidewalks & Bike paths

Item	Quantity	Unit	Unit Cost	Total Cost
Mass Grading	1	lsun	\$75,000.00	\$75,000.00
4" Concrete Sidewalk	2500	sft	\$3.50	\$8,750.00
3" HMA Bike Path	2500	sy	\$8.00	\$20,000.00
Total Division Cost				\$103,750.00

Water Main

Item	Quantity	Unit	Unit Cost	Total Cost
8-inch CL54 Ductile Iron Water Main	1555	lft	\$45.00	\$69,975.00
Polyethylene Wrap	1555	lft	\$0.50	\$777.50
8" x 8" Tapping Sleeve Valve & Well	2	ea	\$2,750.00	\$5,500.00
1-inch Type K Copper Water Service	1	ea	\$775.00	\$775.00
Total Division Cost				\$77,027.50

Sanitary Sewer

Item	Quantity	Unit	Unit Cost	Total Cost
10" ABSTruss Pipe	1800	lft	\$65.00	\$117,000.00
6" PVC SDR 26 Sewer Leads	300	lft	\$50.00	\$15,000.00
4' Diameter Manhole	20	ea	\$2,250.00	\$45,000.00
Total Division Cost				\$177,000.00

Storm Sewer

Item	Quantity	Unit	Unit Cost	Total Cost
12" C-76 CL IV Storm Sewer	351	lft	\$28.00	\$9,828.00
18" C-76 CL IV Storm Sewer	322	lft	\$35.00	\$11,270.00
2' Inlet	4	ea	\$1,500.00	\$6,000.00
4' Manhole	3	ea	\$1,750.00	\$5,250.00
36" CMP Standpipe	1	ea	\$3,000.00	\$3,000.00
18" Concrete End Section	3	ea	\$700.00	\$2,100.00
Total Division Cost				\$37,448.00

Soil Erosion & Sedimentation Control

Item	Quantity	Unit	Unit Cost	Total Cost
Silt Fence	2805	lft	\$3.00	\$8,415.00
Inlet Filters	7	ea	\$250.00	\$1,750.00
Total Division Cost				\$10,165.00

*The applicant shall note that the above document is a sample of an acceptable engineer's estimate. The estimate must include all items of work and appropriate quantities to complete work as described on the plan. Costs shall be based off current material and labor costs.

Appendix D

Pre-Construction Meeting Forums



CONSTRUCTION CONTACT INFORMATION

Project Name: _____
Location (include section #): _____ **Project Supervisor:** _____
OHM Project No.: _____ **Municipality Project No.:** _____

Developer/Owner	Phone:
Street Address	Fax:
City, State & Zip	Email:
Contact Person:	Emergency:

(If a different professional engineer/professional surveyor is going to complete the record drawings, please list them here)

Design Engineer	Phone:
Street Address	Fax:
City, State & Zip	Email:
Contact Person:	Emergency:

Prime Contractor	Phone:
Street Address	Fax:
City, State & Zip	Email:
Contact Person:	Emergency:
Safety Officer:	

CONSTRUCTION CONTACT INFORMATION continued

Mass grading/soil	
Street Address	
City, State & Zip	
Contact Person:	

Phone:	
Fax:	
Email:	
Emergency:	

Underground	
Street Address	
City, State & Zip	
Contact Person:	

Phone:	
Fax:	
Email:	
Emergency:	

Paving	
Street Address	
City, State & Zip	
Contact Person:	

Phone:	
Fax:	
Email:	
Emergency:	

Landscape	
Street Address	
City, State & Zip	
Contact Person:	

Phone:	
Fax:	
Email:	
Emergency:	

Other: Concrete	
Street Address	
City, State & Zip	
Contact Person:	

Phone:	
Fax:	
Email:	
Emergency:	

After the pre-construction meeting, please fax this completed sheet to the OHM Construction Department at 734-522-6427.

CERTIFICATE OF INSURANCE

PRODUCER

YOUR INSURANCE COMPANY

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

COMPANIES AFFORDING COVERAGE
COMPANY A:

INSURED

CONTRACTOR

COMPANY B:
COMPANY C:
COMPANY D:

COVERAGES

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.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	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"/>				GENERAL AGGREGATE \$1,000,000 PRODUCTS-COMP/OP AGG \$500,000 PERSONAL & ADV INJURY \$500,000 EACH OCCURRENCE \$500,000 FIRE DAMAGE (Any one fire) MED EXP (Any one person)
A	AUTOMOBILE LIABILITY <input checked="" 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 UMBRELLA LIABILITY <input type="checkbox"/> ANY AUTO				COMBINED SINGLE LIMIT \$1,000,000 BODILY INJURY (Per person) \$500,000 BODILY INJURY (Per accident) \$500,000 PROPERTY DAMAGE \$200,000 AUTO ONLY-EA ACCIDENT OTHER THAN AUTO ONLY: EACH ACCIDENT AGGREGATE
B	EXCESS LIABILITY <input checked="" type="checkbox"/> UMBRELLA FORM <input type="checkbox"/> OTHER THAN UMBRELLA FORM				EACH OCCURRENCE AGGREGATE
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY THE PROPRIETOR/PARTNERS/ EXECUTIVE OFFICERS ARE: <input type="checkbox"/> INCL <input type="checkbox"/> EXCL				STATUTORY LIMITS EACH ACCIDENT DISEASE-POLICY LIMIT DISEASE-EACH EMPLOYEE
	OTHER				

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

Project Name, Additionally Insured: Orchard, Hiltz & McCliment, Inc., Charter Township of Ypsilanti, the Township Board and individual members thereof, the City of Ypsilanti, the City Board and individual members thereof, the Township and City Engineer and members of his staff, Township and City employees and agents for the Township and City of Ypsilanti Community Utilities Authority, its Board of Commissioners, and the individual members thereof, the YCUA staff and employees, the YCUA Consulting Engineer and his employees, and any and all other agents of YCUA.

CERTIFICATE HOLDER
OWNER/DEVELOPER

CANCELLATION
 SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NEMED TO THE LEFT.

 AUTHORIZED REPRESENTATIVE

MAINTENANCE AND GUARANTEE BOND

(for private site development)

Obligee Review or Project No. _____ Bond No. _____
(if applicable)

KNOW ALL MEN BY THESE PRESENTS:

That we, the developer, _____ (hereinafter called Principal), and _____ (hereinafter called Surety), a corporation organized under the laws of the State of _____ and authorized to do a surety business in the State of Michigan, are held and firmly bound unto the municipal/public agency known as _____ (hereinafter called Obligee) in the full and just sum of _____ Dollars and _____ Cents (\$ _____), lawful money of the United States of America, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has constructed or caused to have constructed the following described public improvements in a public easement and/or right-of-way:

(Check all applicable items)

_____ Storm Sewer System	_____ Roadway
_____ Sanitary Sewer System	_____ Sidewalk or Pathway
_____ Water Main System	_____ Other: _____

which have been or are about to be accepted by the Obligee for the project known as _____ and located in Section _____, T _____, and R _____; more specifically at _____.

AND WHEREAS, it is required that the Principal should guarantee the project from defects caused by faulty materials or workmanship for a period of two year(s) from and after the date of acceptance of same by the Obligee.

The Obligee shall notify the Principal in writing of any defect for which the Principal is responsible and shall specify in said notice a reasonable period of time within which the Principal shall have to correct said defect. If the Principal fails to correct such defect within the time specified in said notice, then the Surety shall have sixty (60) days thereafter within which to take such action as it deems necessary to insure performance of the Principal's obligation. If such defect is not corrected after the expiration of such sixty-day period, then the Obligee shall have the right to correct such defect and the Principal and Surety, jointly and severally, shall pay all costs and expenses incurred by Obligee in correcting such defect; including but not limited to, the engineering, legal, administration and other costs, together with any damages either direct or consequential, which the Obligee may sustain on account of the Principal's failure to correct such defect. In addition, the Obligee shall have the right to contract for the correction of such defect and, upon acceptance of the lowest responsible bid, the Principal and Surety shall become immediately liable for the amount of the said bid.

If any repair is necessary to be made at once to protect life and property, then and in that case, the Obligee may take immediate steps to repair or barricade such defects without notice to the Principal or Surety. In such accounting, the Obligee shall not be held to obtain the lowest figures for the doing of the work, or any part thereof, but all sums actually paid therefore shall be charged to the Principal or Surety. In this instance, the judgment of the Obligee is final and conclusive.

The Principal shall fully indemnify, defend and save harmless the Obligee, and its agents, consultants, employees and officers from all suits and actions for damages of every name and description brought or claimed against them for, or on account of, any injury or damage to person or property received or sustained by any party or parties, by or from any of the acts or omissions or through the negligence of said Principal, and its servants, agents or employees, in the prosecution of the work, and from any and all claims arising under the Workman's Compensation Act, so-called, of the State of Michigan.

NOW, THEREFORE, if the said Principal shall for a period of ____ year(s) from and after the date of acceptance of the completed project by the Obligee replace any and all defects arising in said work whether resulting from defective materials or defective workmanship, then the above obligation shall be null and void; otherwise to remain in full force and effect for ____ year(s) from the date of acceptance by the Obligee.

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

WITNESS

Name: _____

PRINCIPAL

(seal)
By: _____
Name: _____
Title: _____
Address: _____

Phone: _____
Fax: _____

SURETY

Name: _____

(seal)
By: _____
Name: _____
Title: _____
Address: _____

Phone: _____
Fax: _____

Appendix E

Sample Easements

PUBLIC UTILITY EASEMENT

_____, (marital status must be filled in)
“grantor,” whose address is _____,
Ypsilanti, Michigan, in consideration of the sum of One (\$1.00) Dollar, receipt of which is hereby acknowledged and determined to be fair and just compensation by grantor, does, by these presents, covenant and warrant that grantor is the fee simple owner of the property described in **Exhibit A**, attached hereto, and does grant and convey to the Ypsilanti Community Utilities Authority, a Michigan municipal corporation, referred to in this agreement as “grantee,” whose address is 2777 State Road, Ypsilanti, Michigan 48198, a permanent and perpetual easement and right-of-way upon, over, under and across that portion of said property described in **Exhibit B**, attached hereto, for the purpose of construction, installation, inspection, maintenance, repair, operation, alteration, removal (and similar and related activity) of municipally owned utilities, including, without limitation, water lines and/or pipes, storm sewer lines and/or pipes and sanitary sewer lines and/or pipes and any and all connections thereto.

The grantor agrees not to build or to convey to others permission to build any permanent structures on the described easement (**Exhibit B**).

The grantee, by its employees, agents or independent contractors shall have full right, upon, over, under and across said property for the purpose of constructing, installing, inspecting, maintaining, repairing, operating, altering or removing (and similar and related activity) said municipally owned utilities and, further, for the purpose of storing or moving machinery, materials or other incidentals in connection with and during such activity. Further, grantee, by its employees, agents, or independent contractors shall have a permanent easement consisting of the full right of ingress and egress over and upon other lands of the grantor necessary to and for the sole purpose of gaining access to said property and municipally owned utilities.

Upon completion of such construction, installation, inspection, maintenance, repair, operation, alteration or removal (or similar and related activities) of said municipally owned utilities including ingress and egress thereto, any and all of grantor’s property used for said purposes shall be left as nearly and as reasonably possible in the same condition as before such work began and all machinery, materials and equipment shall be removed.

The granting of the permanent easement as stated, including a permanent easement for use of grantor’s property for ingress and egress shall vest in the grantee the authority to use said property solely for the purposes designated in this agreement. This grant of easements shall run with the land and shall be binding upon the heirs, successors and assigns of the grantor and grantee. It is understood and agreed that any and all improvements or appurtenances of the municipally owned utilities in or upon the said property shall become and remain at all times the property of the grantee, its successors and assigns and shall be subject to the grantee’s fees, rules, regulations and local ordinances.

IN WITNESS WHEREOF, grantor has executed this instrument on _____, 20__ .

IN THE PRESENCE OF:

(Witnesses and grantor must print or type name below signature in black ink.)

WITNESSES:

GRANTOR

Subscribed and sworn to before me this _____ day of _____, 20__.

Notary Public
_____ County, Michigan
My Commission Expires: _____

**This instrument drafted by and when
recorded, return to:**

Thomas E. Daniels (P29565)
Pear Sperling Eggan & Muskovitz, P.C.
1349 S. Huron Street, Suite 1
Ypsilanti, MI 48197

Tax Identification No.: _____

EXHIBIT A

Insert a stamped and sealed survey of the subject property.

EXHIBIT B

Insert a stamped and sealed sketch of the easement

Appendix F

Grading Certificate

GRADING CERTIFICATION

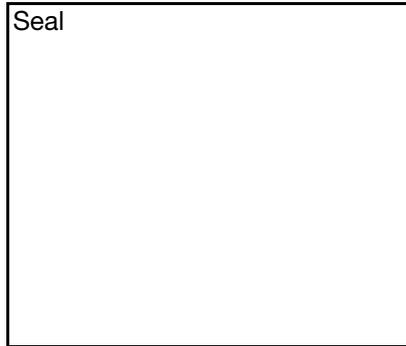
Submit a sealed grading certificate attesting that finish elevations are in compliance with approved grading plan along with the as-built grading plan(s) showing any changes that were made in the field.

These documents were prepared by:

Print Name

Signed

Seal



Appendix G

Private Road Ordinance

ARTICLE II. PRIVATE ROADS

Sec. 47-26. Intent.

The intent of this article is to allow the use of private roads for access to residential areas. Unobstructed, safe, and continuous access to lots is necessary to promote and protect the health, safety, and welfare of the public. Such access is not only necessary for the convenience and safety of residents, but it is crucial to insure that emergency vehicles have safe and efficient access to private property. Therefore, when the use of private roads is permitted, it is essential that they meet minimum standards and specifications. The procedures, standards and specifications hereinafter set forth are provided to assure the even and fair application of requirements to meet the intent of this article.

(Ord. No. 97-174, § 10, 12-16-97)

Sec. 47-27. Definitions.

The following definitions shall apply in the interpretation and enforcement of this article:

Building: An enclosed structure used or intended for use for the housing, enclosure or shelter of people, animals or chattel.

County drain commission: The Drain Commission of Washtenaw County, Michigan.

County road commission: The Road Commission of Washtenaw County, Michigan.

Lot: A parcel of land; real estate.

Permit: A right-of-way permit issued pursuant to this article.

Private driveways: A paved or gravel area directly behind the street curb providing vehicular access to a single-family residence. A private driveway that is shared by two single-family residences that have the appropriate lot width, pursuant to the current requirements of the zoning ordinance, on a public road or approved private road, are not considered private roads and are not regulated by this article.

Private road: A route which provides vehicular access to a lot or lots and which has not been dedicated to public use. For the purposes of this article, the term private road shall include everything within a private road right-of-way.

Road right-of-way: A strip of land reserved for the use of streets, walks, utilities, landscaping and other infrastructure.

Street: The surface within a road right-of-way that is used primarily for the movement of motorized vehicles.

Township board: The Board of the Charter Township of Ypsilanti.

Township clerk: The Clerk of the Charter Township of Ypsilanti.

Township attorney: A person or firm authorized by the township board to perform the duties of township attorney as set forth in this article.

Township engineer: A person or firm authorized by the township board to perform the duties of township engineer as set forth in this article.

Township planner: A person or firm authorized by the township board to perform the duties of township planner as set forth in this article.

(Ord. No. 97-174, § 20, 12-16-97; Ord. No. 2003-311, 3-4-03)

Sec. 47-28. General provisions.

- (a) Every lot in the Charter Township of Ypsilanti that is improved with a building shall have access for ingress and egress for all vehicular traffic including fire, police, and ambulance services and vehicles.
- (b) Frontage on a private road which meets the requirements of this article may be used to satisfy the road frontage and lot width requirements of the zoning ordinance.
- (c) No lot served by a private road shall be improved with a building subsequent to the date of adoption of this article, unless a permit in accordance with this article has been issued.
- (d) No person shall construct, alter, or extend a private road without compliance with this article and obtaining a permit as hereinafter provided. This provision shall not be construed to prohibit normal maintenance of a non-conforming private road.

(Ord. No. 97-174, § 30, 12-16-97)

Sec. 47-28.1. Private driveway design standards.

- (a) Only one house can be constructed using the private driveway standards; more than one house shall require an approved private road.
- (b) A 12-foot wide driveway shall be constructed within a 66-foot wide private right-of-way/easement.
- (c) The private right-of-way/easement shall provide for ingress, egress, stormwater drainage, installation and maintenance of public and private utilities.
- (d) The parcel being served by the private driveway must meet the zoning ordinance requirements for lot width at the front yard setback line as measured from the end of the private driveway right-of-way/easement.
- (e) The design and engineering of a private driveway shall be similar to that of a private road to insure that proper grading and stormwater management is achieved.

(Ord. No. 2003-311, 3-4-03)

Sec. 47-29. Private road design standards.

- (a) All road construction shall be centered on the road right-of-way.
- (b) All paved dead-end roads shall be provided with a cul-de-sac constructed to the following standards:
 - (1) A minimum external right-of-way diameter of 120 feet.
 - (2) Cul-de-sac roads shall terminate in circular pavement areas with a minimum diameter of 90 feet.
 - (3) Curbed, landscaped islands are required within any cul-de-sac circle. Such islands shall have a minimum radius of 20 feet.
- (c) Right-of-way intersections shall have a radius of 15 feet.
- (d) A boulevard cross section will be permitted at the main entrance to a development subject

to the following standards:

- (1) A minimum right-of-way width of 100 feet shall be provided for the entire length of the boulevard.
 - (2) A boulevard median shall not exceed 300 feet in length nor shall it be less than 100 feet in length.
 - (3) Sufficient taper of the right-of-way width, in accordance with design speed, must be provided adjacent to a boulevard section.
 - (4) Boulevard islands shall be curbed and shall be no less than ten feet and no greater than 20 feet in width.
 - (5) Boulevard islands shall not extend beyond the edge of the intersecting road, or its auxiliary lane.
 - (6) Sufficient taper of the roadway width must be provided, as per MDOT requirements, adjacent to the interior end of a boulevard.
- (e) Horizontal curves in proposed streets which appear to be continuous shall be not less than 230 foot centerline radius.
- (f) The radius of corners at all intersections shall be at least 35 feet to the edge of pavement.
- (g) The intersecting angle of proposed center lines of roads shall be 90 degrees.
- (h) The horizontal alignment of road intersections shall include at least a 100 foot long tangent in all directions. An exception will be allowed for a T-intersection on the outside of a curve, provided that adequate sight distance is assured.
- (i) Intersections within a subdivision shall be spaced at least 125 feet apart from centerline to centerline.
- (j) When possible, approaches of side roads from opposite sides of a through road should be in direct alignment.
- (k) The road layout shall connect to existing outlots in adjacent developments, and shall provide outlots or other provisions for future connections to adjacent land that is presently undeveloped.
- (l) The layout of roads in the proposed plan shall provide at least two points of access to an existing public road and shall provide a continuous circuit for travel. An exception will be considered when, in the opinion of the board, the lands to be subdivided are limited in area or are subject to a natural barrier. Private roads shall not exceed 600 feet in length unless connected to another road system providing a second means of access to the development. Connections to existing public road systems shall be subject to the review and approval of the county road commission.
- (m) A minimum right-of-way width of 66 feet shall be provided.
- (n) Unless more stringent standards are required by this or other Ypsilanti Township ordinances, the connection between the right-of-way and the public road shall conform to the standards and specifications of the county road commission.
- (o) The right-of-way shall provide for ingress, egress, drainage and installation and maintenance of public and private utilities.
- (p) All private roads serving five or more lots shall provide the following:
- (1) Private roads providing ingress and egress to all two-lane, paved major or secondary thoroughfares shall be provided with paved acceleration and deceleration lanes and passing lanes.

(2) Private roads providing ingress and egress to all three-lane, paved major or secondary thoroughfares shall be provided with paved acceleration and deceleration lanes.

(3) Private roads providing ingress and egress to roads of four or more lanes shall be provided with paved tapers or turning lanes.

(4) Required lanes or tapers shall be indicated schematically on a site plan and shall be constructed in accordance with the standards for such facilities as established by the township engineer and/or the county road commission.

(q) All private roads shall meet the minimum design standards as set forth in Table 1 below.

Table 1
Requirements and Specifications for Private Roads

TABLE INSET:

Improvement	4 Lots or Less	5 Lots or More	
	Any Size	Lots 1 Acre or More	Lots Less Than 1 Acre
Minimum Right-of-Way Width	66 Feet	66 Feet	66 Feet
Minimum Street Width	18 Feet	24 Feet From Edge to Edge	29 Feet From Back of Curb
Street Surface Type	Gravel	Paved Bituminous	Paved Bituminous
Drainage Management	Ditch, No Curb	Ditch	Full Gurb and Gutter
Sidewalks	No	No	Yes

(r) The number of lots served by a private road cannot be increased to more than four unless said road meets the standards in Table 1 above.

(s) Lots that are one acre or greater in area and served by a private road cannot be divided to a size less than one acre unless said road meets the standards in Table 1 above.

(t) Private roads shall have a grade no greater than six percent. The grades within a street intersection shall not exceed three percent for a distance of 100 feet from the point of intersection.

(u) All private roads shall be built to meet or exceed Ypsilanti Township standards for private road construction.

(Ord. No. 97-174, § 40, 12-16-97)

Sec. 47-30. Submittal of application.

Applications for approval of a plan for private road construction shall be delivered to the township clerk and shall include the following:

(1) A legal description of each lot to be served by the private road, a legal description of the right-of-way, the names and addresses of all persons or parties owning an interest in

the title to the lots and right-of-way area.

(2) All plans shall be drawn on 24 inches by 36 inches sheets at a scale not smaller than one inch equals 40 feet horizontal, one inch equals four feet vertical.

(3) All elevations shall be related to the North American Datum, NAD, of 1988.

(4) All drawings shall be prepared by a civil engineer, registered in the State of Michigan.

(5) Drawings, shall be provided showing the following general information.

a. A map of existing conditions shall be provided showing at least the following information:

1. Adjoining subdivisions.
2. Adjoining roads.
3. Existing county or private drains, sewers and crossroad culverts on existing roads.
4. Railroads.
5. Adjoining parks and schools.
6. Easements for public access for construction and maintenance of drains, public utilities, etc., and their dimensions, in, over, and across private property within the development.
7. All trees with a diameter of eight inches or greater within 60 feet of centerline.
8. Existing buildings within 50 feet of the proposed right-of-way.
9. Existing topographic contours, at two-foot intervals.
10. Wetlands and water bodies inside of and within ten feet of the proposed right-of-way.
11. North arrow.

b. A location map not smaller than one inch equals 2000 feet with a north arrow.

c. The address, telephone number, seal and signature of the person who prepared the drawing.

d. Existing or proposed lot lines.

e. A map showing dimensions and bearings of the entire parcel

f. Proposed contours at two-foot intervals.

g. Two benchmarks in NAD that will not be affected by the construction of the private road.

(6) Plans for the private road including the following:

a. Plan view of each road showing the centerline, stations, edge of pavement and curb line if appropriate.

b. Location of proposed culverts, storm sewers and utilities.

c. Location of proposed traffic control and road-name signs.

d. Location of proposed street-light poles.

e. Intersection details (radius, auxiliary lanes, sight distance, curb tapers etc.).

- f. All pertinent survey information (a minimum of two benchmarks, curve data, section corners, north arrow, etc.).
 - g. Soil boring logs at sufficient intervals to determine the sub-grade condition. Soil borings shall be at a minimum of seven feet below proposed centerline elevations.
 - h. Location of all proposed sidewalks and bike paths, and any proposed curb drops to accommodate sidewalks.
 - i. Proposed topographic contours, at two-foot intervals, of the right-of-way area and all adjacent land.
 - j. Names of existing and proposed roads.
- (7) Drainage plan requirements for private roads with underground drainage systems.
- a. The location, size and invert elevations of all underground structures used for road drainage including:
 - 1. Location and type of inlets and clean-out points for underground drainage systems, including sumps in all catch basins.
 - 2. Standard detail for all catch basins, inlets, manholes, etc.
 - 3. Schedule of structure diameters, casting types, rim and invert elevations and sump notation where applicable.
 - 4. Detention design per township standards.
 - b. Profile of centerline.
 - c. Profile of top-of-curb with corresponding profile of right-of-way line.
 - d. Percent of grade and vertical curve data.
 - e. Profile of centerline, ditch and proposed ditch of county road(s) intersecting with the proposed private road.
 - f. Curb elevations a minimum of every 25 feet and centerline elevations at a minimum of every 50 feet.
 - g. Show locations and profile of all drains outside of the roadway area that are going to be used for roadside drainage and contours to show how flow will be directed there.
 - h. Invert elevations at all structures.
 - i. Legend of profile lines shall be shown on each road according to illustrations.
 - j. Notations shall be included to require continuous under-drain behind all curbs.
- (8) Drainage plan requirements for private roads with open ditch drainage systems.
- a. The location, size and depth of all underground structures used for road drainage including the following:
 - 1. Culvert size and lengths providing access to all lots in the development.
 - 2. Sizes, lengths, classes or gauges, and locations of all crossroad culverts.
 - 3. Detention/retention design information.
 - b. Each profile must be shown separately for the following:

1. Existing and proposed centerline.
 2. Right ditch and right-of-way.
 3. Left ditch and right-of-way.
 4. Centerline, ditch and proposed ditch of county road(s) adjacent to proposed subdivision with proper outlet thereto.
- c. Percent of grade of proposed centerline and independent ditches.
 - d. Numerical elevations of the existing and proposed centerline at each station (100 ft. or change in grade).
 - e. Vertical curve information.
 - f. Erosion control information (ditch bottom, slopes, sod, rip-rap, etc.).
 - g. Invert elevations of crossroad culverts.
 - h. Front slope and back slope information.
 - i. All drainage easements, including those in areas where the drainage outlet is not within control of a public agency.

(9) A complete statement of all terms, conditions and agreements related to the proposed private road.

(10) An agreement regarding the interconnection, access rights, maintenance and improvements of the right-of-way and roadway shall be submitted to the township for review. Such agreement shall include at least the following:

- a. Said maintenance agreement shall be in a form that will allow it to be recorded with the Washtenaw County Register of Deeds.
- b. The agreement shall run with the land and specifically address the liability and responsibility of the parties to said agreement to maintain the private road pursuant to the specifications of this article. This shall include but is not limited to provisions for annual maintenance, snow removal, and the eventual repair or reconstruction of the road.
- c. The agreement shall include rules regarding voting rights and responsibilities of parties to the agreement in relation to road maintenance and improvements.
- d. The agreement shall include detailed legal descriptions of the private road and all properties allowed to use the road.
- e. The agreement shall state that "the private road system may be connected to future public or private road systems when stub streets are shown on the approved plan for private roads."

(11) A fee, as established by resolution of the township board, to defray the costs of inspection, plan review, administration and enforcement of this article, shall be collected with each application.

(12) The application shall be signed by the applicant or agent thereof, in which case, it shall be accompanied by a duly executed and notarized power of attorney and shall represent that the applicant is making the application on behalf of all persons having an interest in the right-of-way or the abutting lots and shall be made under penalties of perjury.

(Ord. No. 97-174, § 50, 12-16-97)

Sec. 47-31. Plan approval and permit procedure.

(a) Upon receipt of an application, the township clerk shall bring the application before the township board at its next regular meeting. The township board shall refer the application materials to the appropriate bodies for review including but not limited to:

(1) The township engineer who will review the plans to assure that the proposal is in keeping with construction standards of this and other township ordinances.

(2) The township planner who will review the plans to assure that the proposal is in keeping with the township master plan and appropriate provisions of this article.

(3) The township attorney who will review all agreements.

(4) The township traffic consultant, if requested by the township, who will make recommendations regarding the number and location of curb cuts to public roads, potentials for connections, the need for signage, and other issues generally related to traffic management.

(5) The township fire department who will review street names, hydrant locations, turn-arounds and other applicable provisions. The board may, at its discretion, refer the application to the township planning commission or other appropriate bodies for review and comment.

(b) The township board shall consider the application, the reports of all reviewing agencies and all other relevant information in determining whether to approve the plan. The township board may impose such conditions as it deems necessary to achieve the intent and objectives of this article, which may include, but need not be limited to, conditions suggested by the review agencies. The breach of any such condition proposed by the township board shall automatically invalidate the plan.

(c) Approval of a plan for a private road shall be valid for a period of one year, or such longer period as determined by the township board, from the date of approval. If an application has not been filed for a permit for private road construction within the allotted time frame, then the approval shall be null and void and of no force and effect.

(d) Upon receiving plan approval, the applicant may file for a permit for the private road's construction. At such time, the following must be submitted to the township clerk:

(1) The applicant shall deposit with the township treasurer a sum of money, bank letter of credit or certified check in the amount sufficient to guarantee that the applicant shall perform the terms and conditions of the permit, including the payment of required fees. Upon issuance of certificate of completion any unused portion of the deposit shall be refunded to the applicant.

(2) A fee to cover township costs including the cost for township inspections. If the applicant does not directly pay the costs of inspection, the same shall be paid from the deposit noted in subsection (1) above.

(3) Proof that the county road commission has reviewed the plan. Proof can be in the form of a letter or permit.

(4) Proof that the county drain commission has reviewed the plan.

(5) Proof that an agreement regarding the interconnection, access rights, maintenance and improvements of the right-of-way, has been recorded with the Washtenaw County Register of Deeds.

Upon receipt of the required funds and information, the township clerk shall issue the permit

pursuant to the terms established by the township board resolution approving the application.

(e) Only the township shall have the authority to approve or deny applications for permits for private road construction. Permits issued by other governmental entities shall not serve as a substitute.

(f) A permit for private road construction shall be valid for a period of one year, or such longer period as determined by the township board, from the date of issuance of the required improvements. If the improvements have not been completed within the allotted time frame, then the permit shall be null and void and of no force and effect and all deposits shall be forfeited to Ypsilanti Township.

(Ord. No. 97-174, § 60, 12-16-97)

Sec. 47-32. Administration and enforcement.

(a) All required improvements shall be inspected by the township engineer at various stages of construction.

(b) The applicant's engineer shall certify to the township engineer, before the final inspection and report thereon are made, that the required improvements were made in accordance with this article and all approved plans.

(c) Upon completion of construction of the leveling course the township engineer shall make a final inspection and shall report the results of the final inspection to the township clerk in writing. Upon favorable recommendation from the township engineer, the township clerk shall issue a tentative certificate of completion.

(d) No building permit shall be issued for any lot fronting on a private road unless a tentative certificate of completion has been issued by the township.

(e) Upon completion of construction of the wearing course the township engineer shall make a final inspection and shall report the results of the final inspection to the township clerk in writing. Upon favorable recommendation from the township engineer, the township clerk shall issue a final certificate of completion.

(Ord. No. 97-174, § 70, 12-16-97)

Sec. 47-33. Variances.

When there are practical difficulties or unnecessary hardships in the way of carrying out the strict letter of this article, such as topographical and other physical characteristics of a parcel, the township board shall have the power to vary or modify the application of the provisions of this article so that the intent and purpose of this article shall be observed, public safety secured and substantial justice done.

(1) Any applicant may apply for a variance from any provision of this article by filing an application for variance with the township clerk.

(2) The township board shall hold a public hearing upon such application within 45 days of its filing.

(3) The township clerk shall give notice of the hearing to the owners of all property abutting and/or having access for ingress and egress of traffic by means of the private road described in the variance application, as well as law enforcement officials, fire officials and ambulance companies known by the clerk to serve such property. The notice shall be mailed to each such party and published in a newspaper of general circulation in the township no later than seven days prior to the hearing. Any party may

appear and comment at the hearing in person or by agent or by attorney.

(4) The township board shall keep a record of said hearing and shall render a decision not later than the next regular township board meeting held after the hearing date.

(5) The township board may attach reasonable conditions in granting any variance from any provision of this article, and the breach of any conditions or the failure of any applicant to comply with the conditions shall void the variance.

(6) If construction of the road has not commenced within two years from the date that a variance was granted, then the variance shall be null and void. The township board may grant a longer time frame and may grant an extension when so requested by the applicant.

(Ord. No. 97-174, § 80, 12-16-97)

Sec. 47-34. Nonconforming situations.

Private roads, legally constructed prior to the adoption of this article may continue in use subject to the following:

(1) No such road shall be enlarged or extended unless the entire road is brought into compliance with the standards of this article.

(2) No additional lots or home sites shall be created which are accessed by a nonconforming private road unless the entire road is brought into compliance with the standards of this article.

(3) Lots lawfully created prior to the adoption of this article, which are accessed by a nonconforming private road may be used in accordance with the requirements of the zoning ordinance.

(Ord. No. 97-174, § 90, 12-16-97)

Sec. 47-35. Violation and penalties.

Any person who violates any of the provisions of this article shall be deemed guilty of a misdemeanor and shall be punished by a fine of not more than \$500.00 or by imprisonment in the county jail for a period not to exceed 90 days or by both such fine and imprisonment. Any access which is used in violation of the terms of this article may be abated, restrained, enjoined and prohibited upon the commencement of an appropriate action in the circuit court.

(Ord. No. 97-174, § 100, 12-16-97)

Sec. 47-36. General exceptions.

Parcels or projects that are over 70 dwelling units or over 700 feet from a major or secondary thoroughfare subject to site plan, planned development, condominium or site condominium review by the planning commission shall be prohibited from utilizing private roads as defined in this article.

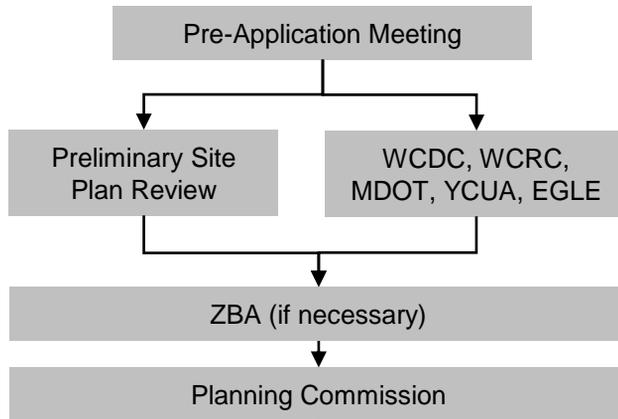
(Ord. No. 2001-268, 5-15-01; Ord. No. 2003-310, 2-4-03)

Appendix H

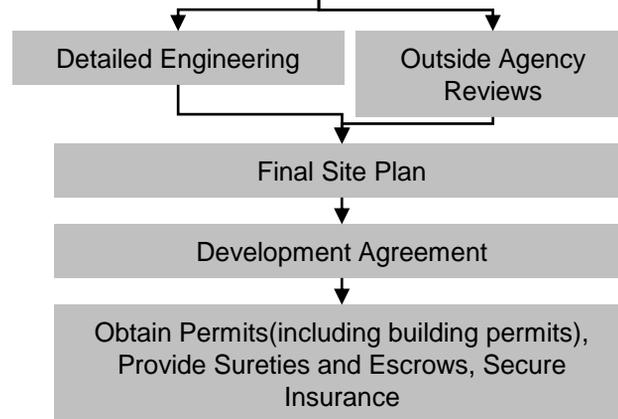
Development Flow Chart

Ypsilanti Township Development Process Flow Chart

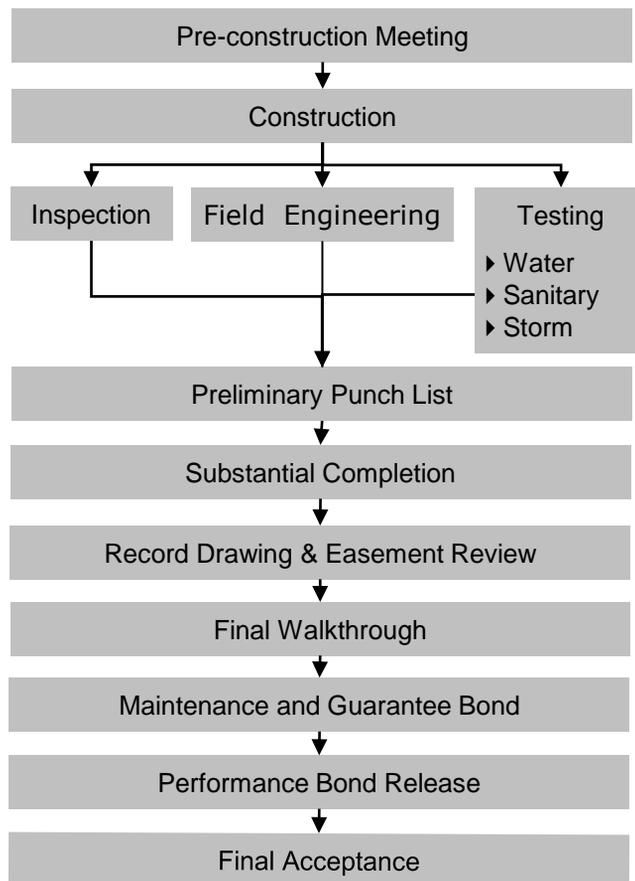
Site Plan Review Phase



Detailed Engineering Review Phase



Construction Phase



Appendix I

Stormwater Maintenance Agreement

**STORMWATER MANAGEMENT
LONG-TERM MAINTENANCE AGREEMENT AND PLAN**

THIS AGREEMENT is made this _____ day of _____, 20____, by and between the Charter Township of Ypsilanti, a municipal corporation, with principal offices located at 7200 S. Huron Dr. Ypsilanti, MI 48197, hereinafter "Township" and a _____ Michigan _____, with principal offices located _____, hereinafter "Proprietor".

RECITALS

1. Proprietor is developing certain property located in the Charter Township of Ypsilanti, Washtenaw County, Michigan as _____ ("Development") and as more particularly described in Exhibit "C" attached hereto.

2. The Proprietor must construct a stormwater management system to provide adequate drainage in the proposed Development as more particularly described in Exhibit "A" attached hereto.

3. The Township and the Proprietor desire that the stormwater management system to be constructed in the Development be maintained in perpetuity to ensure that it functions properly as designed and in conformity with applicable laws and regulations.

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, and fully incorporating the above-stated recitals into the agreement, the Township and the Proprietor agree as follows:

AGREEMENT

1. The Proprietor shall fully, completely, and unconditionally assume the obligations of maintaining the stormwater management system in the Development as follows:

A. The Proprietor agrees that it will inspect, repair, and maintain, at its own expense, the storm drainage system which is located within the Development in conformity with all applicable laws and regulations and in conformity with this Agreement. If the Proprietor fails to do so, then, upon reasonable notice to the Proprietor, the Township may enter upon said premises for the purposes of inspecting, repairing, and maintaining said storm drainage system, in which event the Proprietor agrees to pay the Township all reasonable charges and expenses incurred thereon.

2. The Proprietor, its agents, representatives, successors, and assigns shall defend, indemnify, and hold the Township harmless from and against any claims, demands, actions, damages, injuries, costs, or expenses of any kind or nature whatsoever, hereinafter "Claims", fixed or contingent, known or unknown, arising out of or in any way connected with the design, construction, use, inspection, maintenance, repair, or operation (or omissions in such regard) of the storm drainage system which is the subject of this Agreement. This indemnity

and hold harmless shall include reasonable costs, expenses, and attorney fees incurred by the Township in connection with such Claims or the enforcement of this Agreement.

3. This agreement shall bind the Proprietor, its successors and assigns, and any person or entity claiming any right or ownership in the Development and shall run with the land.

4. This Agreement shall be recorded at the Proprietor's expense with the Washtenaw County Register of Deeds.

5. Despite the indication of the drafter indicated below, which is included for recording purposes only, this Agreement shall not be construed in favor or against either Proprietor or Township, as it is a result of their mutual efforts.

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

Name of Entity

WITNESSES:

By:

Its:

STATE OF MICHIGAN)
)ss:
COUNTY OF _____)

The foregoing instrument was acknowledge before me on this ____ day of ____, 20__ by _____, who stated under oath that s/he is the _____ of the _____ and that this easement was signed on behalf of the _____, by authority of its _____, and s/he acknowledged the granting of this easement to be the free act and deed of the _____.

Notary Public
_____ County, Michigan
Acting in Washtenaw County
My commission expires: _____

INSTRUMENT DRAFTED BY:
Charter Township of Ypsilanti

WHEN RECORDED RETURN TO:
Charter Township of Ypsilanti
Attn: Ms. Karen Lovejoy-Roe, Clerk
7200 S. Huron Drive
Ypsilanti, Michigan 48197

EXHIBIT A

Map Depicting Physical Limits of Stormwater Management System

EXHIBIT B

Detention Pond/Forebay

REQUIRED MAINTENANCE:

- Check the outlet regularly for clogging and clean when necessary (annually).
- If necessary, based on surroundings, mow grass side slopes (two times per year).
- Inspect entire system annually, including inlet/outlet pipes, restricted outlet structure(s), animal grates, and filters.
- Check banks and bottom for erosion and correct as necessary (annually).
- Remove sediment when accumulation reaches six (6) inches or if resuspension is observed.
- Re-seed banks near inlet/outlet and stabilize eroded banks as necessary.
- Add grasses such as sedges and rushes.
- Remove dead vegetation (early spring) that obstructs flow.
- Maintain a record of all maintenance performed on the system for Township inspection upon request.

If the outlet is pumped, then only a licensed electrician or company that provided the pump system should conduct any maintenance. Chemicals should not be applied to the detention basins, side slopes, or butter strip.

Manufactured/Underground Detention Systems

REQUIRED MAINTENANCE:

- Check the outlet regularly for clogging and clean when necessary (annually).
- Inspect the entire system, including inlet/outlet pipes, restricted outlet structure(s), and water quality structures (two times per year).
- Clean detention system, if its volume has been reduced by more than ten (10) percent due to accumulation of silt and sediment.
- Maintain a record of all maintenance performed on the system for Township inspection upon request.

Storm Sewer Collection Systems

REQUIRED MAINTENANCE:

- Check the outlet regularly for clogging and clean when necessary (annually).
- Inspect entire storm sewer distribution system (two times per year).
- Clean storm sewer structures when accumulation of silt and sediment reaches six (6) inches or greater.
- Clean grates on inlets, outlets, and other storm sewer structures regularly.
- Water channels should be cleaned regularly.
- Maintain a record of all maintenance performed on the system for Township inspection upon request.

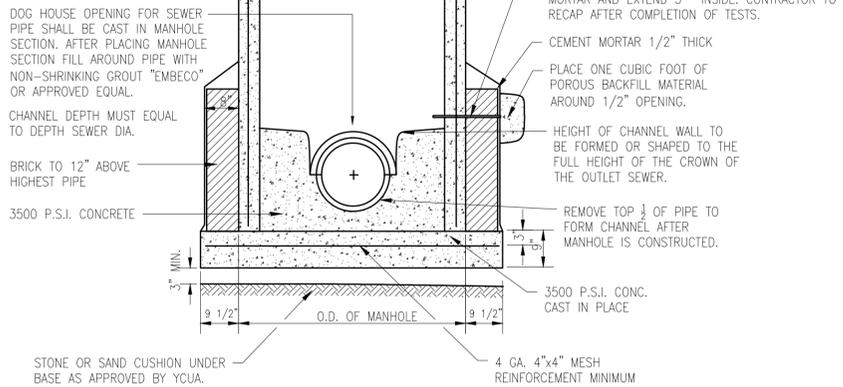
**Upon completion of the annual routine inspections,
documentation shall be provided to the Charter Township of Ypsilanti.**

Mail to: Charter Township of Ypsilanti
7200 S. Huron Drive
Ypsilanti, MI 48197
Attn: Planning and Zoning Department

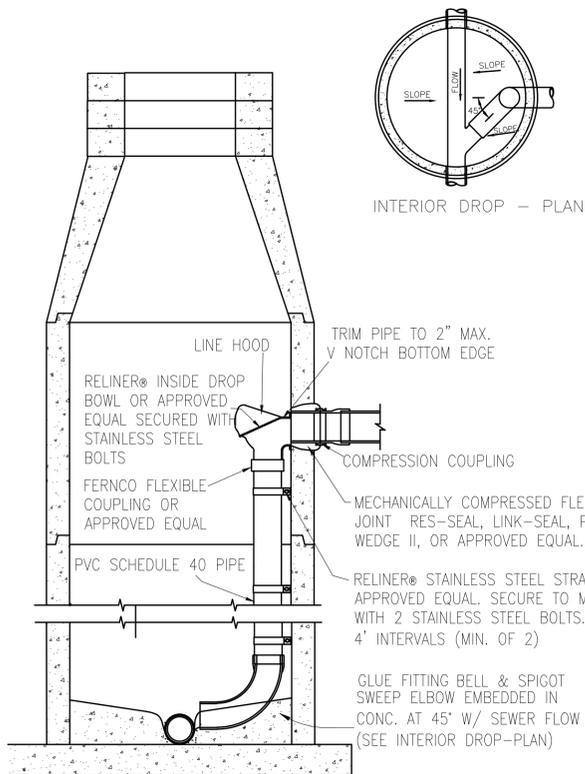
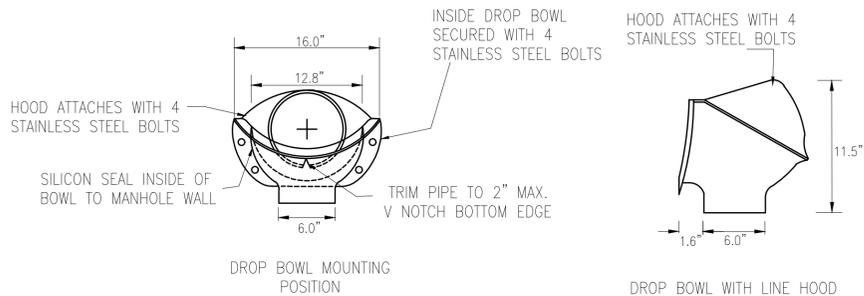
EXHIBIT C

Legal Description of Property

SEWER SIZE	MAX. CUT OUT SIZE
8" THRU 10"	17 1/2"
12" THRU 15"	20"

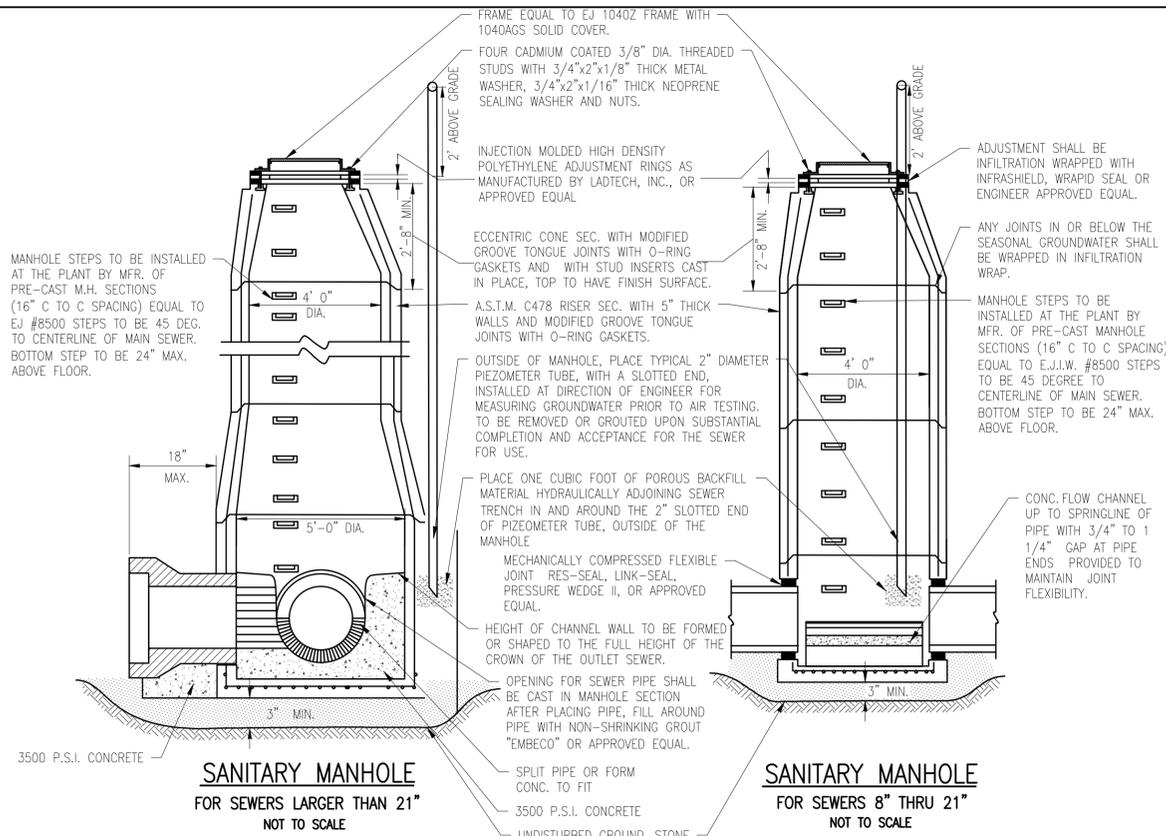


SANITARY MANHOLE
ON EXISTING SEWERS 8" THRU 42"
NOT TO SCALE



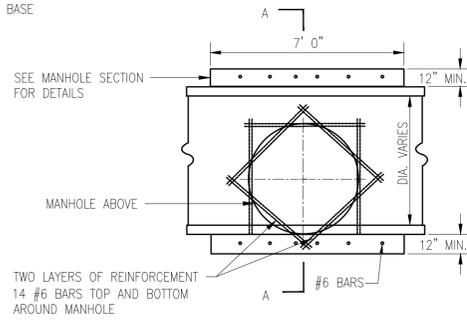
INTERIOR DROP CONNECTION
NOT TO SCALE

DIA. OF SEWER	DIA. OF DROP CONNECTION
4"	4"
6"	4"
8"	6"
10"	8"

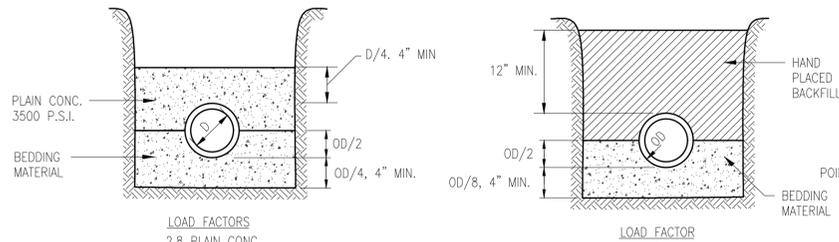


SANITARY MANHOLE
FOR SEWERS LARGER THAN 21"
NOT TO SCALE

SANITARY MANHOLE
FOR SEWERS 8" THRU 21"
NOT TO SCALE



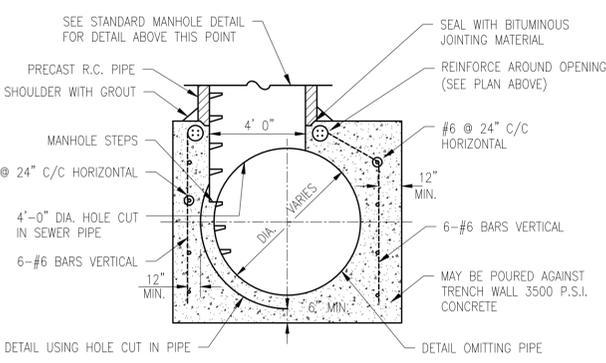
MANHOLE PLAN
48" & LARGER SEWERS
NOT TO SCALE



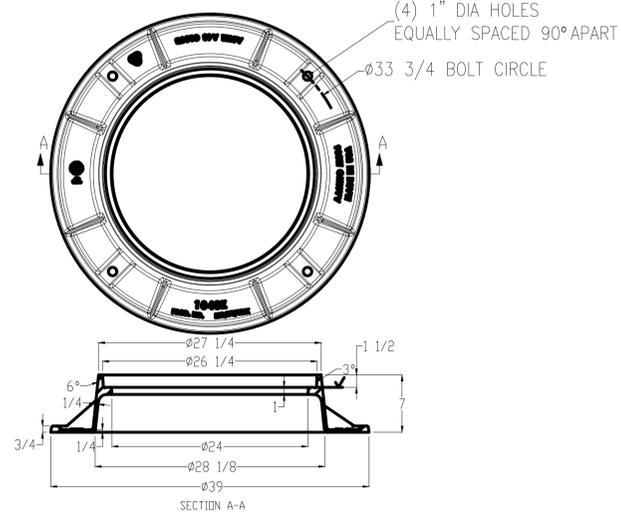
MAX. WIDTH OF TRENCH 12" ABOVE TOP OF PIPE
6" THRU 12" PIPE 30" WIDE
15" THRU 36" PIPE - OD+16"
42" THRU 60" PIPE - OD+20"
OVER 60" PIPE OUTSIDE DIA. OF PIPE+24"

MIN. WIDTH OF TRENCH 12" ABOVE THE TOP OF THE PIPE SHALL BE 6" ON EACH SIDE OF PIPE.

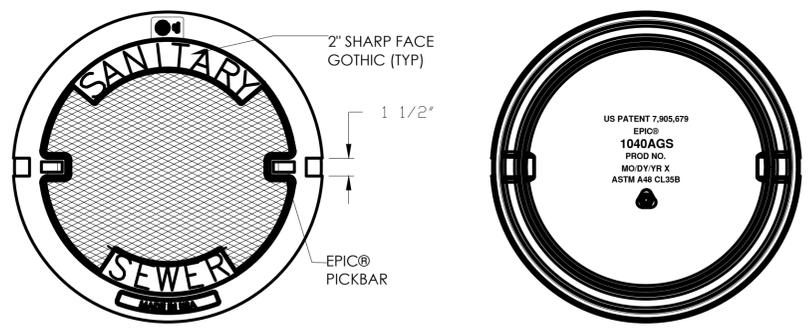
PIPE BEDDING DETAILS



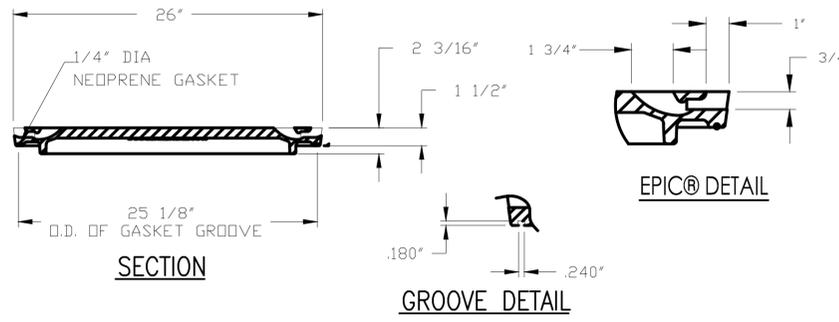
MANHOLE SECTION
48" & LARGER SEWERS
NOT TO SCALE



1040Z FRAME



BOTTOM VIEW



1040 AGS COVER



Know what's below.
Call before you dig.



REVISIONS

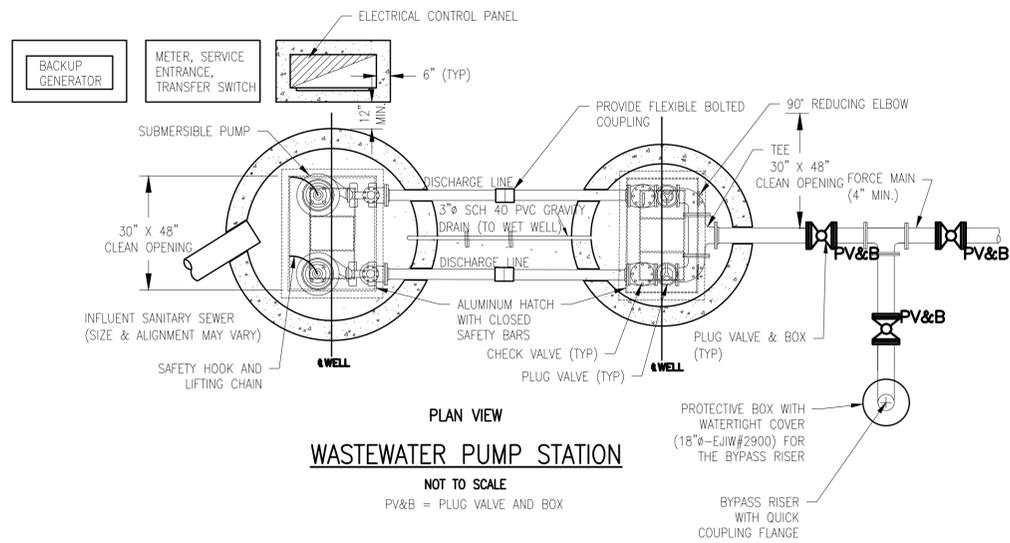
STANDARD SANITARY
SEWER DETAILS

YPSILANTI COMMUNITY UTILITIES AUTHORITY
2777 STATE ROAD
YPSILANTI, MICHIGAN 48198-9112
(734) 484-4800
FAX: (734) 544-7221
WWW.YCUA.ORG

YCUA
ENVIRONMENTAL LEADERS

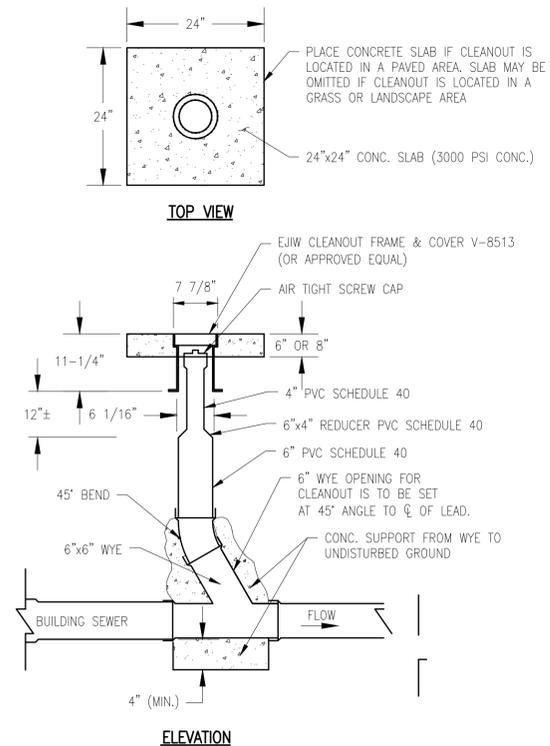
DATE: 10/25/19
SCALE: NO SCALE
SHEET:

ALL DRAWINGS AND WRITTEN MATERIALS APPEARING HEREIN CONSTITUTE THE ORIGINAL AND UNPUBLISHED WORK OF YCUA AND THE SAME MAY NOT BE DUPLICATED, DISTRIBUTED, OR DISCLOSED WITHOUT PRIOR WRITTEN CONSENT OF YCUA.



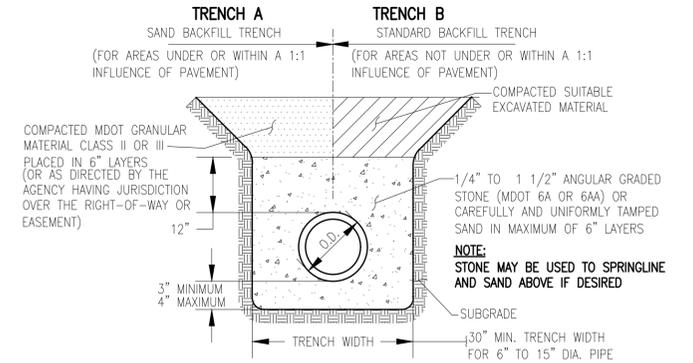
WASTEWATER PUMP STATION

NOT TO SCALE
PV&B = PLUG VALVE AND BOX



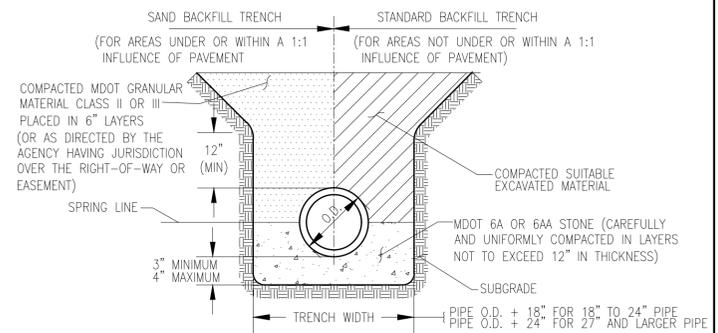
SANITARY SEWER CLEANOUT

NOT TO SCALE



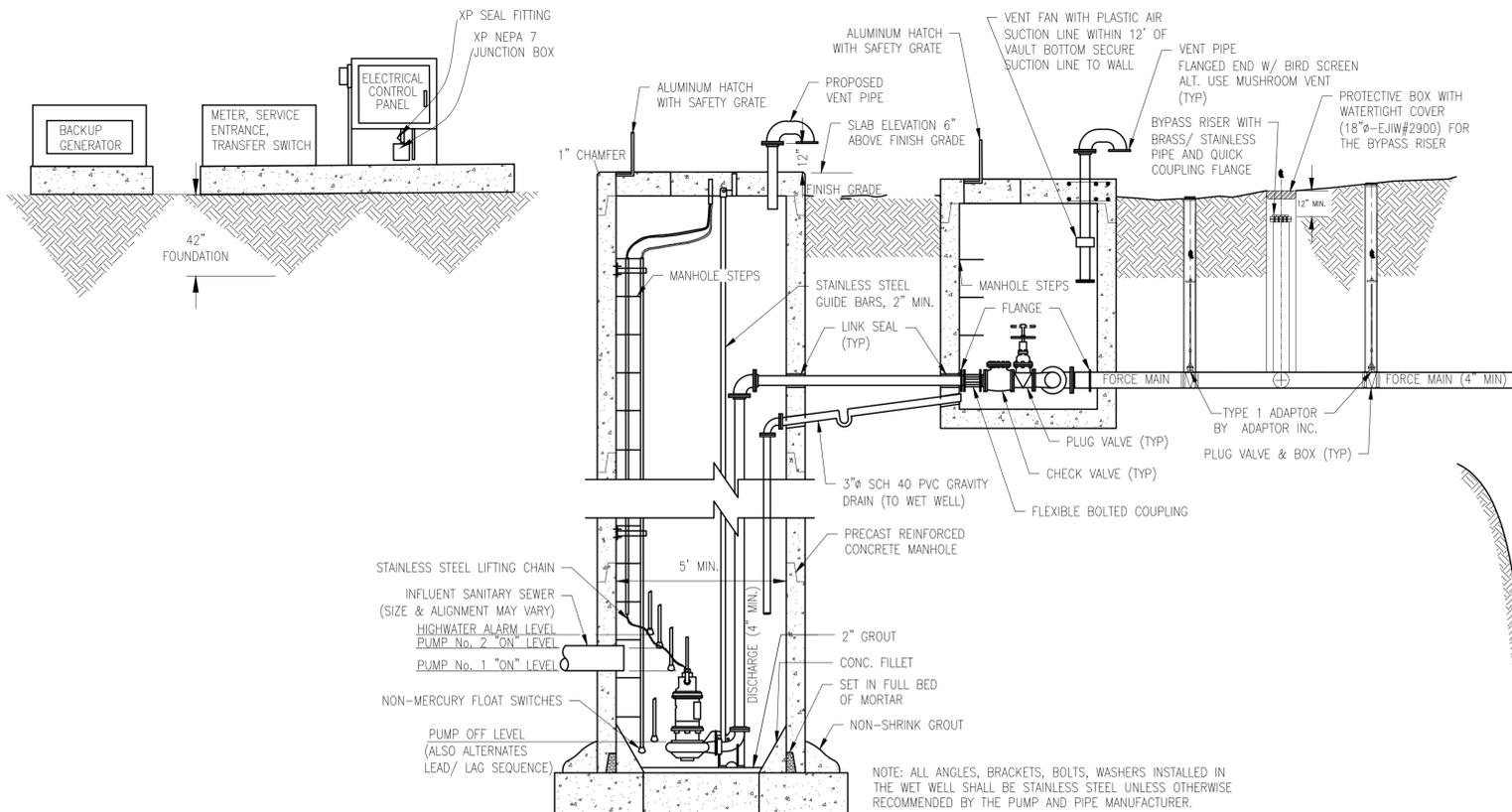
FLEXIBLE PIPE (8\"/>

NOT TO SCALE



RIGID PIPE (18\"/>

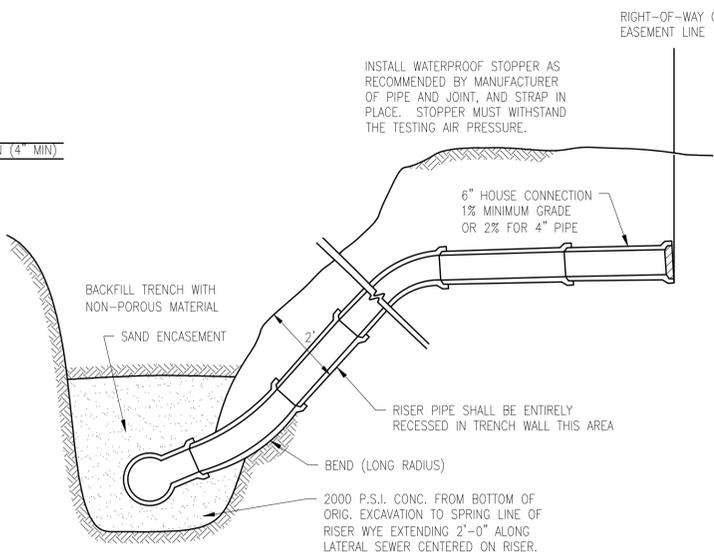
NOT TO SCALE



WASTEWATER PUMP STATION

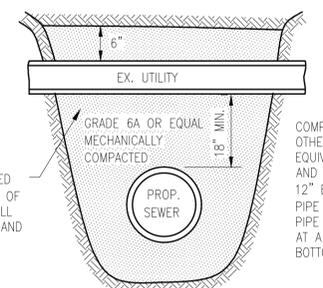
NOT TO SCALE

DETAILS ARE FOR LAYOUT AND GENERALITIES ONLY. THE SPECIFIC COMPONENTS AND EXACT DETAILS MUST BE IDENTIFIED OR CREATED ON A CASE BY CASE BASIS THROUGH A DETAILED SUBMITTAL REVIEW PROCESS.



BUILDING SEWER

NOT TO SCALE



STANDARD PIPE SUPPORT

SANITARY OR STORM
NOT TO SCALE

WHERE DET. "D" BEDDING IS SPECIFIED FOR NEW UTILITY A 6" MIN. LAYER OF MECHANICALLY COMPACTED SAND SHALL BE MAINTAINED BETWEEN EX. UTILITY AND TOP OF CONC. ENCASEMENT.



Know what's below.
Call before you dig.



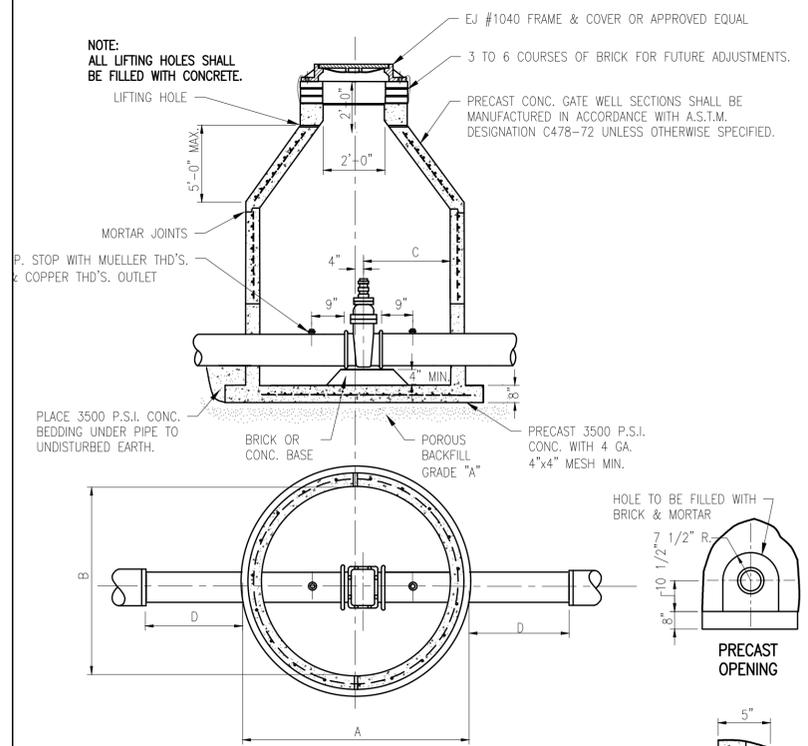
REVISIONS

STANDARD SANITARY SEWER DETAILS

YPSILANTI COMMUNITY UTILITIES AUTHORITY
 2777 STATE ROAD
 YPSILANTI, MICHIGAN 48198-9112
 (734) 484-4800
 FAX: (734) 544-7221
 WWW.YCUA.ORG

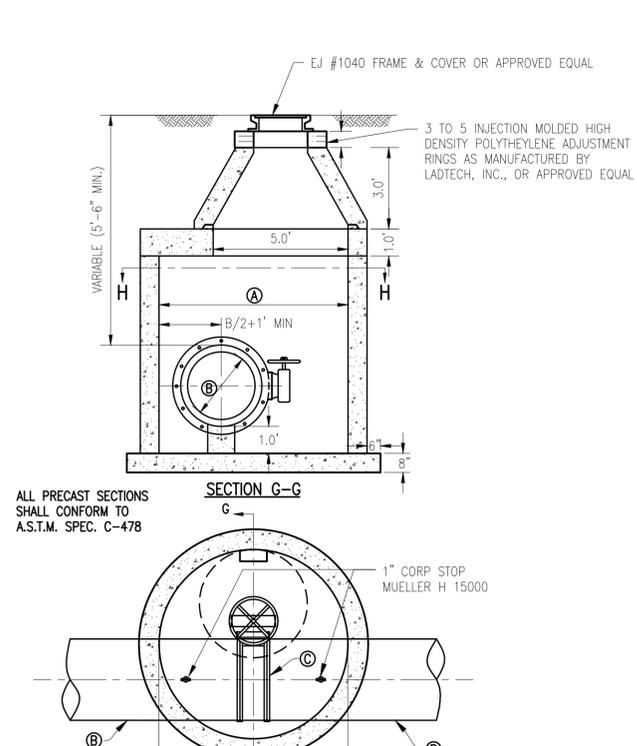
DATE	SCALE	SHEET
10/25/19	NO SCALE	

ALL DRAWINGS AND WRITTEN MATERIALS APPEARING HEREIN CONSTITUTE THE ORIGINAL AND UNPUBLISHED WORK OF YCUA AND THE SAME MAY NOT BE DUPLICATED, DISTRIBUTED, OR DISCLOSED WITHOUT PRIOR WRITTEN CONSENT OF YCUA.



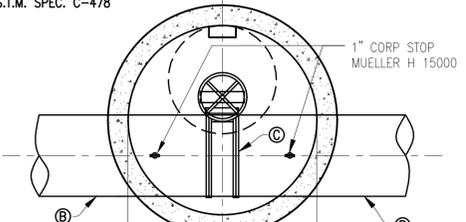
SIZE	A	B	C	D
8"	5'-0"	4'-0"	2'-2"	—
12"	5'-6"	4'-6"	2'-5"	—
16"	6'-0"	5'-6"	2'-8"	3'-0" MIN. * 13'-0" MAX.

STANDARD PRECAST GATE VALVE & WELL (CONCENTRIC)



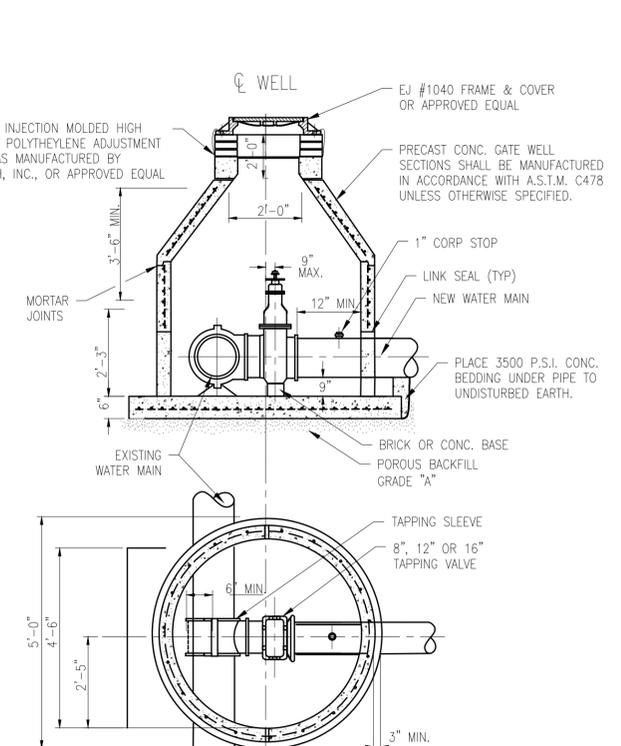
ALL PRECAST SECTIONS SHALL CONFORM TO A.S.T.M. SPEC. C-478

SECTION G-G



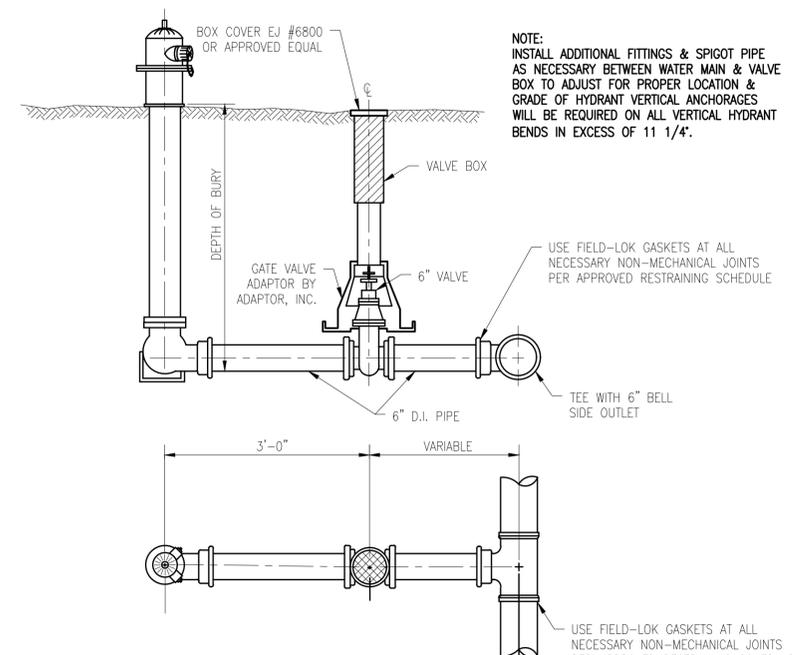
BUTTERFLY VALVE AND WELL (CONCENTRIC) NOT TO SCALE

A	B
DIA WELL	DIA MAIN
7'-0"	20"
7'-0"	24"
8'-0"	30"
8'-0"	36"

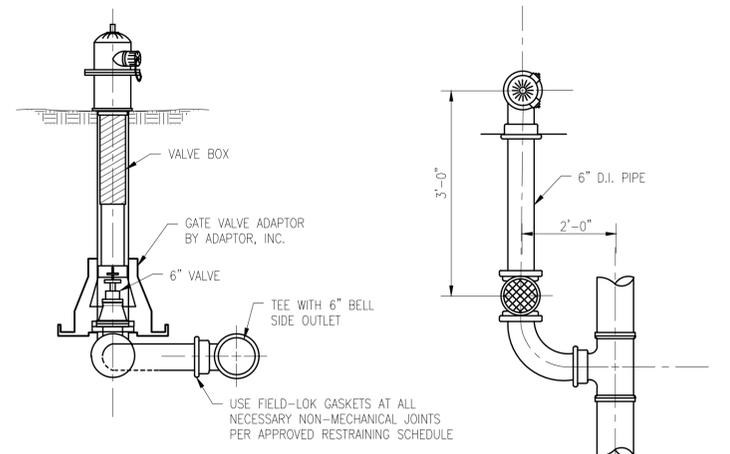


WM	A	B	C	D
8"	5'-0"	4'-0"	2'-2"	—
12"	5'-6"	4'-6"	2'-5"	—
16"	6'-0"	5'-6"	2'-8"	3'-0" MIN. * 13'-0" MAX.

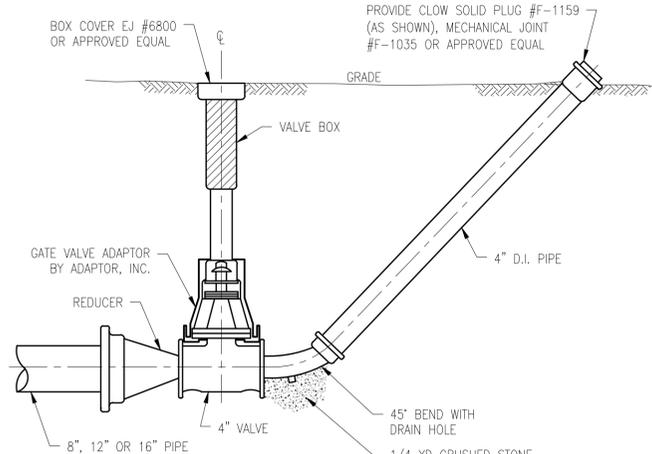
GATE VALVE & WELL (CONCENTRIC) NOT TO SCALE



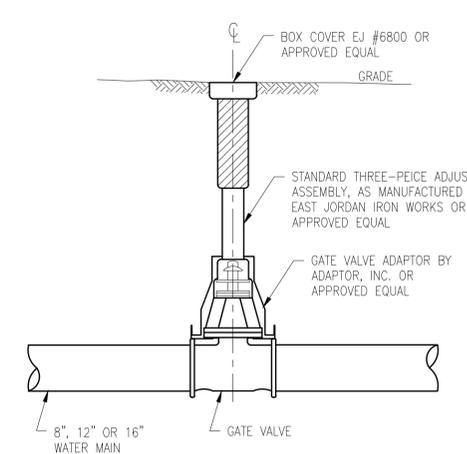
STANDARD HYDRANT SETTING NOT TO SCALE



CLOSE COUPLE HYDRANT SETTING NOT TO SCALE



4" BLOWOFF NOT TO SCALE



GATE VALVE & BOX NOT TO SCALE



Know what's below. Call before you dig.



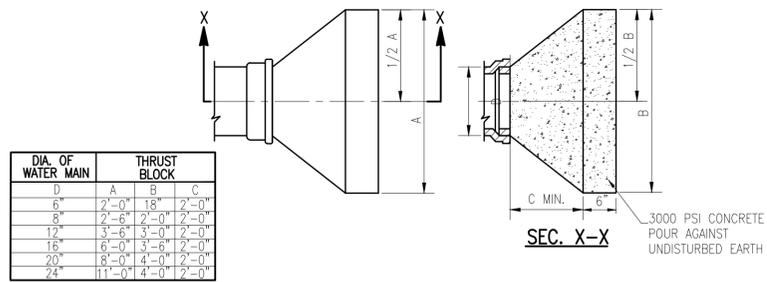
REVISIONS

STANDARD WATER MAIN DETAILS

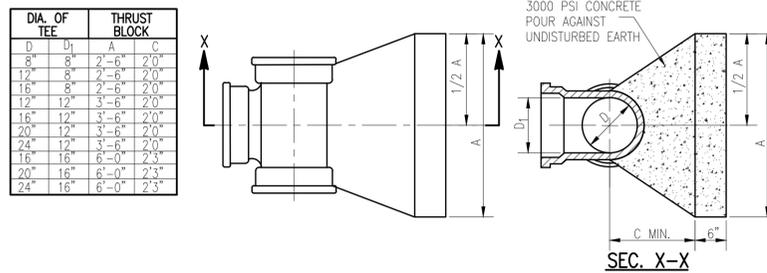
YPSILANTI COMMUNITY UTILITIES AUTHORITY
 2777 STATE ROAD
 YPSILANTI, MICHIGAN 48198-9112
 (734) 484-4800
 ENVIRONMENTAL LEADERS
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DATE: 09/25/19
 SCALE: NO SCALE
 SHEET:

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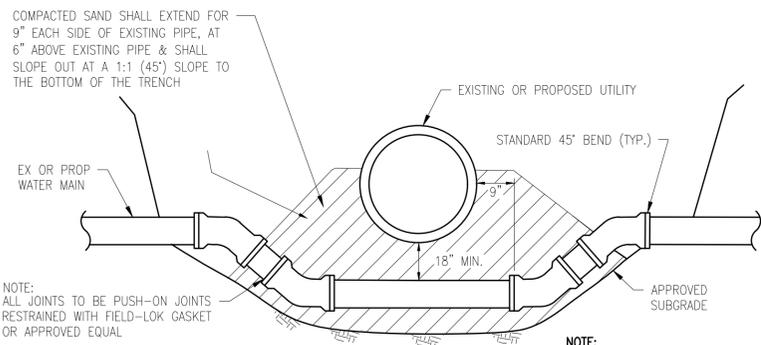


THRUST BLOCK AT PLUG OR HYDRANT SHOE
NOT TO SCALE



THRUST BLOCK AT TAPPING SLEEVE TEE
NOT TO SCALE

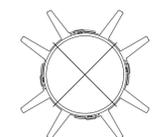
NOTE: CONCRETE THRUST BLOCKS WILL NOT BE PERMITTED EXCEPT BEHIND HYDRANT SHOES AND TAPPING SLEEVES. USE OF CONCRETE THRUST BLOCKS IN OTHER LOCATIONS WILL NOT BE PERMITTED WITHOUT THE WRITTEN APPROVAL OF YCUA. ALL OTHER VERTICAL AND HORIZONTAL BENDS SHALL BE RESTRAINED WITH FIELD-LOK GASKETS OR APPROVED MECHANICAL JOINTS.



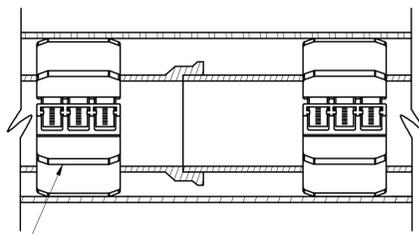
WATER MAIN LOWERING
NOT TO SCALE

NOTE: ALL JOINTS TO BE PUSH-ON JOINTS RESTRAINED WITH FIELD-LOK GASKET OR APPROVED EQUAL

NOTE: FOR BEDDING OF WATER MAIN SEE STANDARD PIPE SUPPORT DETAIL



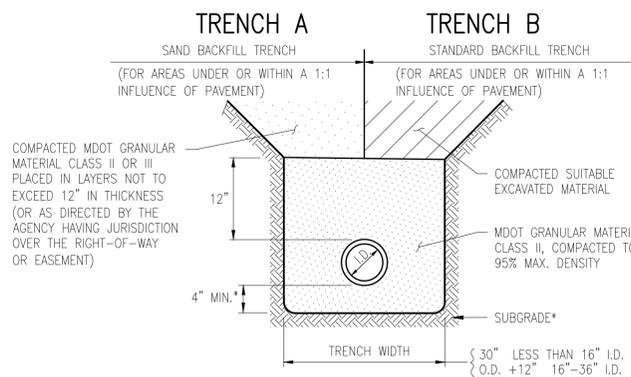
SPACER END VIEW
NOT TO SCALE



STANDARD CASING SECTION
NOT TO SCALE

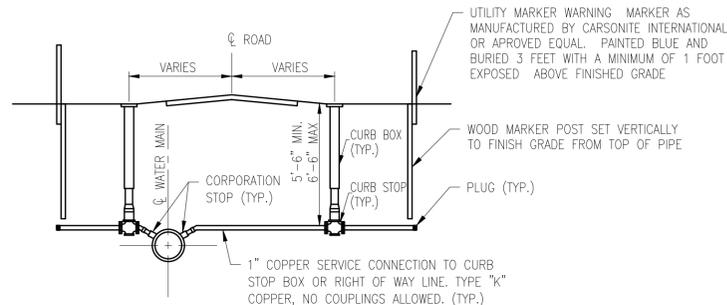
NOTES:

- SPACERS FOR PLACEMENT IN THE ANNULAR SPACE BETWEEN THE CARRIER PIPE AND A CASING PIPE SHALL BE RANGER II AS MANUFACTURED BY PSI OR APPROVED EQUAL.
- END SEALS SHALL BE MODEL C RUBBER SEAL WITH STAINLESS STEEL BANDS AS MANUFACTURED BY PSI OR APPROVED EQUAL.

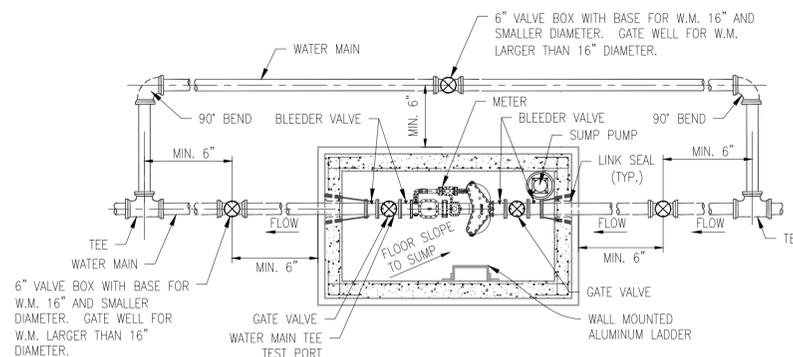


BEDDING AND TRENCH BACKFILL DETAIL FOR WATER MAIN
NOT TO SCALE

NOTE: IF THE EXISTING SUBGRADE MATERIAL MEETS THE REQUIREMENTS FOR MDOOT GRANULAR MATERIAL CLASS II (MINIMUM 4\"/>



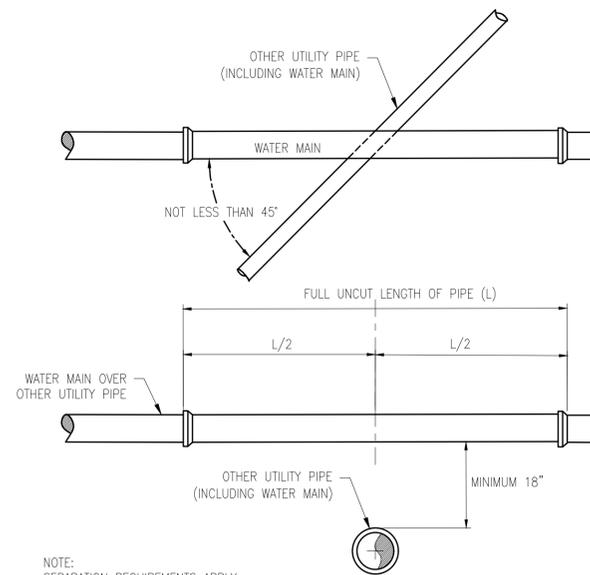
TYPICAL WATER SERVICE
NOT TO SCALE



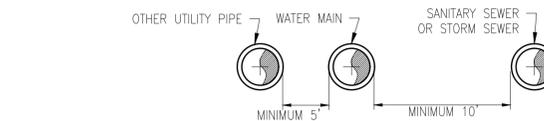
MASTER METER VAULT CONFIGURATION (WITHOUT COVER)
NOT TO SCALE

NOTES:

- WHERE POSSIBLE THE METER VAULT SHALL BE LOCATED AWAY FROM TRAFFIC AREAS, ROADS, PARKING LOTS, ETC.
- THE ACCESS HATCH SHALL BE SIZED LARGE ENOUGH TO ACCOMMODATE REMOVAL OF THE LARGEST METER OR THE LARGEST APPURTENANCE FOR MAINTENANCE PURPOSES. THE HATCH SHALL BE MANUFACTURED BY THE BILCO COMPANY. METER VAULT HATCH SHALL BE WATER TIGHT.
- THE METER VAULT FLOOR SHALL BE SLOPED TO THE SUMP.
- ELECTRICAL SERVICE SHALL BE SUPPLIED TO THE VAULT.

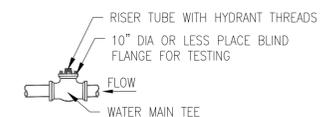


VERTICAL SEPARATION



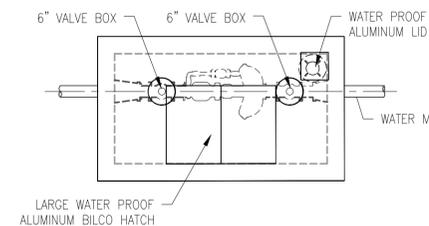
HORIZONTAL SEPARATION

WATER MAIN CROSSING OTHER UTILITIES
NOT TO SCALE



TEST PORT

PIPE DIA	TEST PORT SIZE
6"	6"
8"	8"
10"	10"
12"	10"
16"	10"



MASTER METER VAULT CONFIGURATION WITH COVER
NOT TO SCALE



Know what's below.
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REVISIONS

STANDARD WATER MAIN DETAILS

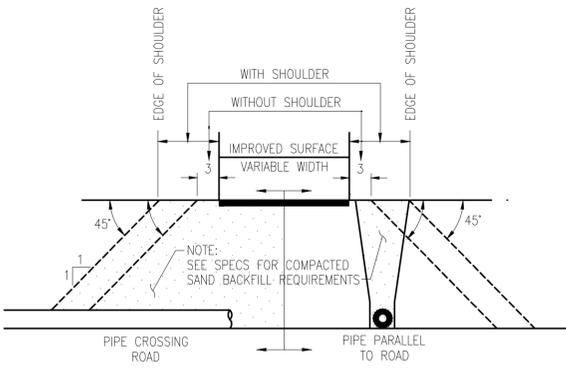
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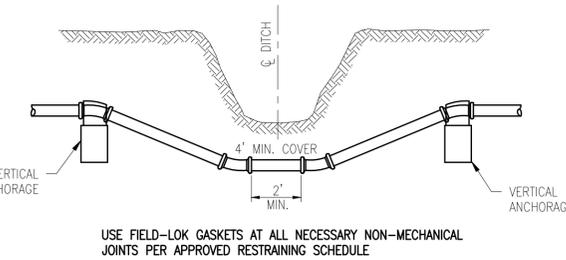
DATE	SCALE	SHEET
09/25/19	NO SCALE	

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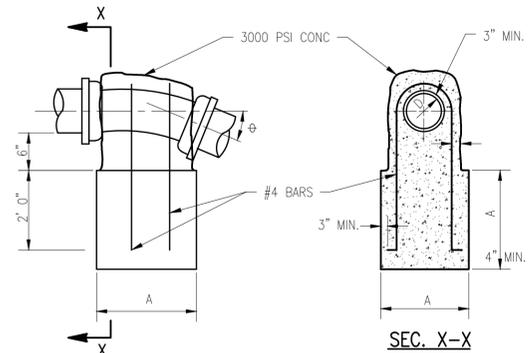
TRACER WIRE DETAILS



**BACKFILL IN THE AREA OF STREETS, ALLEYS
SIDEWALKS, DRIVES & PARKING LOTS**
NOT TO SCALE



STANDARD DITCH CROSSING
NOT TO SCALE



DETAIL OF VERTICAL ANCHORAGE
NOT TO SCALE

DIA. OF WATER MAIN	BEND	A	NUMBER OF BARS
6"	22 1/2°	2'-0"	2
6"	45°	3'-3"	2
8"	22 1/2°	3'-3"	2
8"	45°	4'-0"	3
12"	11 1/4°	3'-3"	2
12"	22 1/2°	4'-0"	3
16"	11 1/4°	3'-3"	2
16"	22 1/2°	4'-0"	3
20"	11 1/4°	4'-0"	2
20"	22 1/2°	5'-0"	3
24"	11 1/4°	4'-0"	2
24"	22 1/2°	5'-0"	3

PIPE RESTRAINT SCHEDULE

THE FOLLOWING TABLE IS A JOINT RESTRAINT SCHEDULE (DIPRA) FOR GROUND-BURIED DUCTILE IRON OR PVC PIPE. LENGTHS OF PIPE RESTRAINT ARE GIVEN IN FEET.

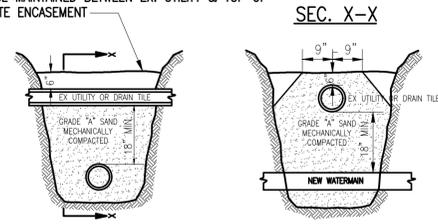
PIPE DIAMETER	TEES, 90° PLUGS	45° BENDS	22 1/2° BENDS	REDUCERS
6"	40	25	25	30
8"	55	25	25	30
12"	80	35	25	55
16"	100	40	25	60
24"	135	56	25	65

BASED UPON

INTERNAL PRESSURE: 180
PIPE DEPTH: 5
BEDDING CLASS: TYPE 4
SOIL TYPE: GOOD SAND
SAFETY FACTOR: 2

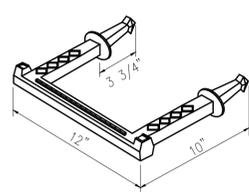
- IF PIPE DIAMETER IS NOT LISTED IN THIS TABLE, THE NEXT LARGEST PIPE SHALL BE USED. THIS TABLE IS BASED ON A TEST PRESSURE OF 180 PSI (OPERATING PRESSURE PLUS WATER HAMMER).
- FOR OTHER TEST PRESSURES, ALL VALUES TO BE INCREASED OR DECREASED PROPORTIONALLY. THE VALUES PROVIDED OF RESTRAINT LENGTH ARE IN EACH DIRECTION FROM THE POINT OF DEFLECTION OR TERMINATION EXCEPT FOR TEES, AT WHICH ONLY THE BRANCH IN THE DIRECTION OF THE STEM.
- IF TIE RODS ARE USED, USE FOUR RODS MINIMUM AND ADD 1/8 INCH TO BAR DIAMETER AS CORROSION ALLOWANCE. SIZE REDUCTION IS BASED UPON THE PIPE DIAMETER SHOWN IN THIS TABLE.
- MANUFACTURER'S RESTRAINT SCHEDULE AND SPECIFIC SITE CONDITIONS MAY MODIFY THE ABOVE SCHEDULE. ANY ALTERNATIVE SCHEDULE SHALL BE SUBMITTED TO YCUA FOR APPROVAL.

NOTE: WHERE CONCRETE ENCASEMENT IS SPECIFIED FOR NEW UTILITY A 6" MINIMUM LAYER OF MECHANICALLY COMPACTED SAND SHALL BE MAINTAINED BETWEEN EX. UTILITY & TOP OF CONCRETE ENCASEMENT

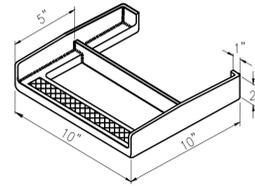


COMPACTED SAND SHALL EXTEND FOR 9" EACH SIDE OF EXISTING PIPE, AT 6" ABOVE EXISTING PIPE & SHALL SLOPE OUT AT A 1:1 (45°) SLOPE TO THE BOTTOM OF THE TRENCH

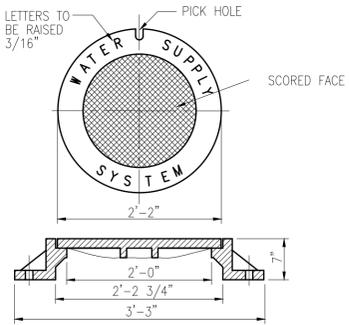
STANDARD PIPE SUPPORT
NOT TO SCALE



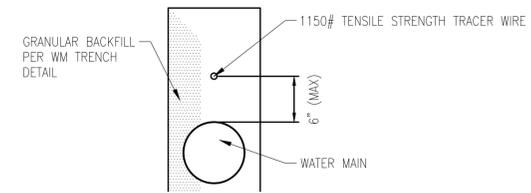
MANHOLE STEP
M.A. PSI-375
USE AS REQUIRED



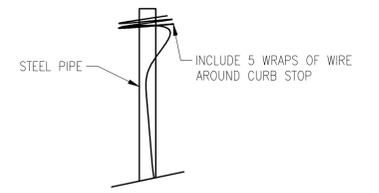
STANDARD MANHOLE STEP
EJ 8500
USE AS REQUIRED



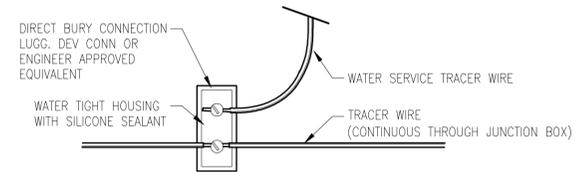
STANDARD FRAME & COVER
EJ #1040
USE AS REQUIRED



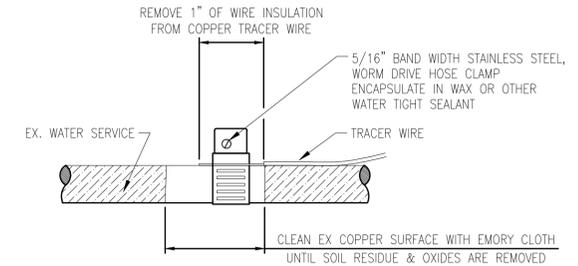
OPEN CUT MAIN LINE TRENCH
NOT TO SCALE



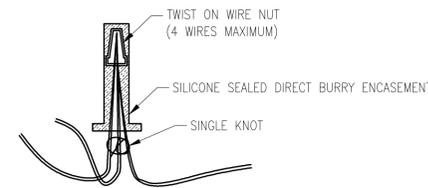
CURB BOX WIRE COIL
NOT TO SCALE



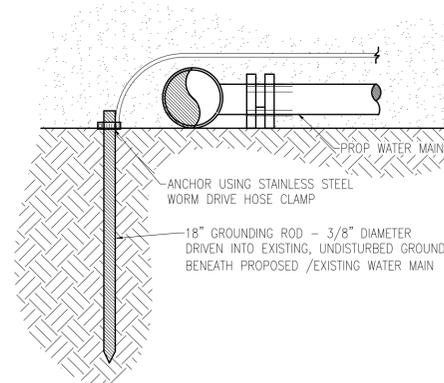
MAIN LINE JUNCTION BOX
NOT TO SCALE



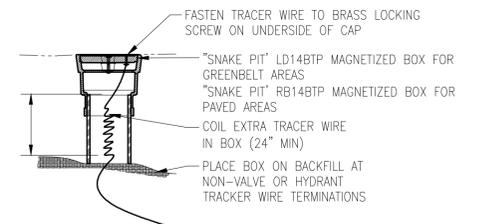
WATER SERVICE TERMINATION
NOT TO SCALE



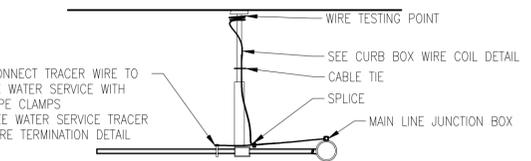
SPLICE CONNECTOR
NOT TO SCALE



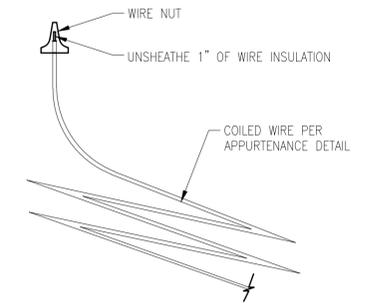
GROUNDING ROD TERMINATION
NOT TO SCALE



TRACER WIRE TEST POINT
NOT TO SCALE



CURB STOP CONNECTION
NOT TO SCALE



WIRE TESTING POINT
NOT TO SCALE



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STANDARD WATER MAIN DETAILS

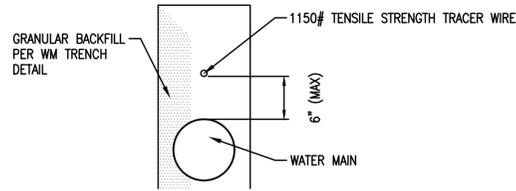
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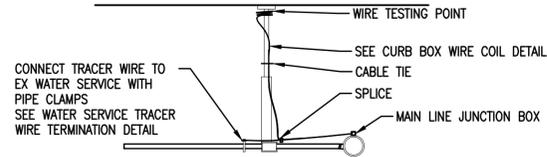
DATE	SCALE	SHEET
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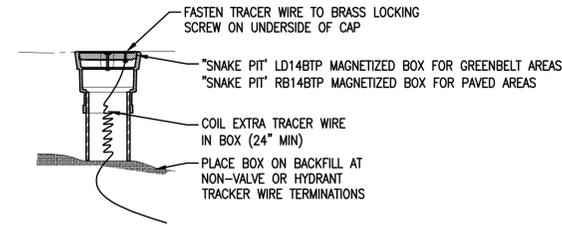
TRACER WIRE SHALL BE INCLUDED WITH ALL PVC WATER MAIN INSTALLATIONS



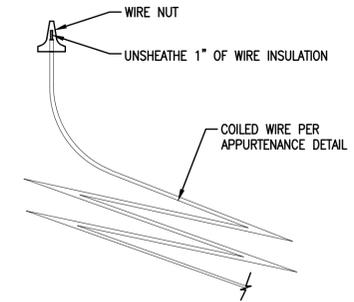
OPEN CUT MAIN LINE TRENCH
N.T.S.



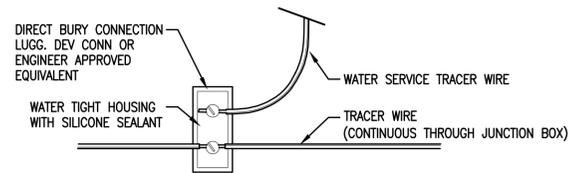
CURB STOP CONNECTION
N.T.S.



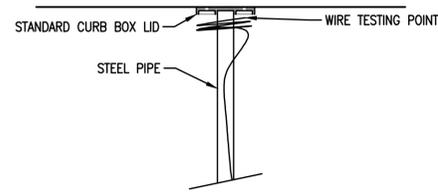
TRACER WIRE TEST POINT
N.T.S.



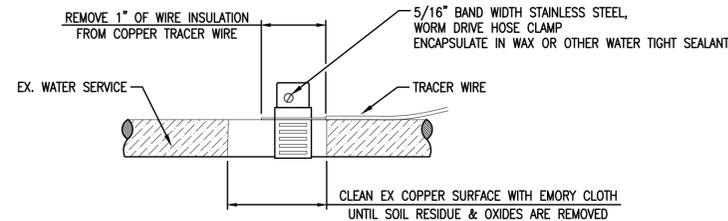
WIRE TESTING POINT
N.T.S.



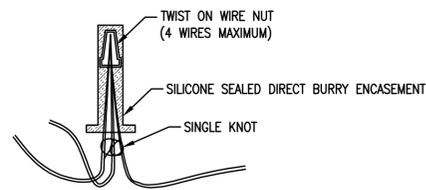
MAIN LINE JUNCTION BOX
N.T.S.



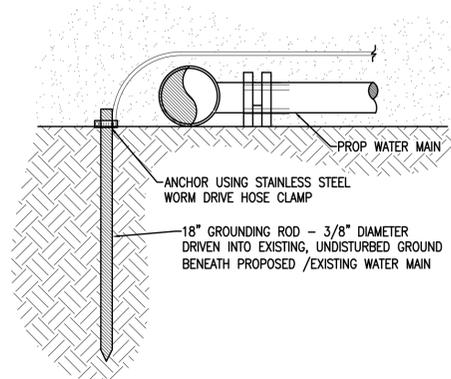
CURB BOX WIRE COIL
N.T.S.



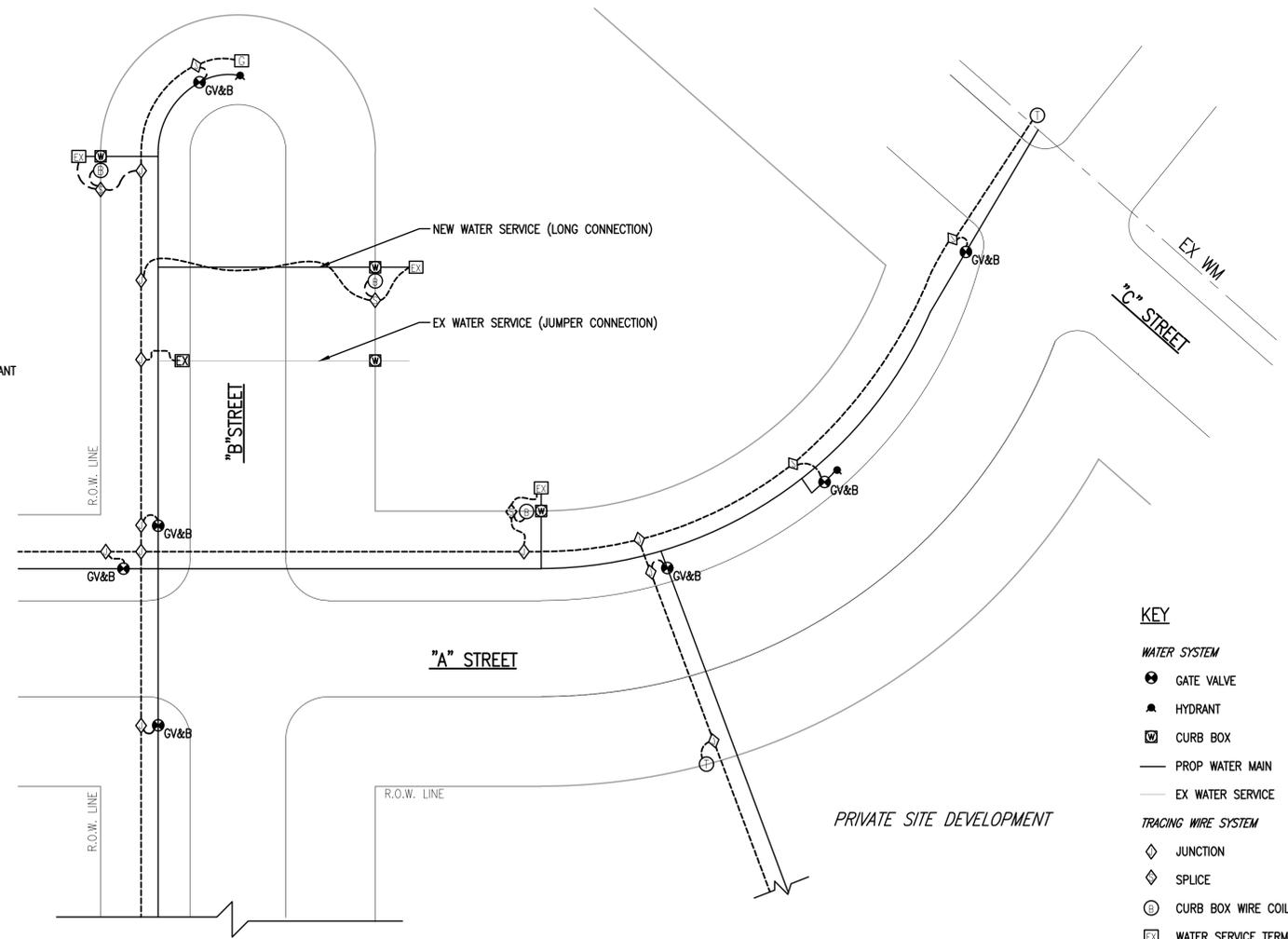
WATER SERVICE TERMINATION
N.T.S.



SPLICE CONNECTOR
N.T.S.



GROUNDING ROD TERMINATION
N.T.S.



- KEY**
- WATER SYSTEM**
- GATE VALVE
 - ▲ HYDRANT
 - ◻ CURB BOX
 - PROP WATER MAIN
 - EX WATER SERVICE
- TRACING WIRE SYSTEM**
- ◇ JUNCTION
 - ◇ SPLICE
 - ⊙ CURB BOX WIRE COIL
 - ◻ WATER SERVICE TERMINATION
 - TEST POINT
 - ◻ GROUNDING ROD TERMINATION
 - TRACING WIRE

TRACER WIRE SYSTEM SCHEMATIC



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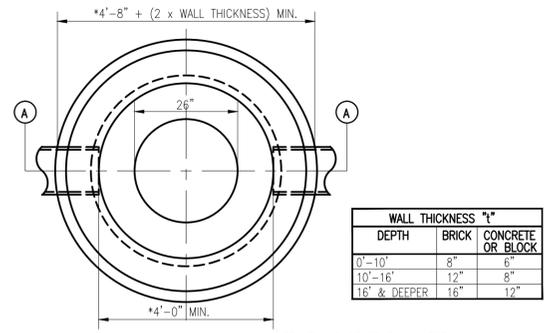
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SCALE	VERT. DATUM
CITY/TOWNSHIP	REVISIONS
COUNTY	REVISIONS
RANGE	REVISIONS
TOWN	REVISIONS
SECTION	REVISIONS
PROJ. NO.	REVISIONS
ENG. ARCH.	REVISIONS
CADD	REVISIONS
DATE	REVISIONS

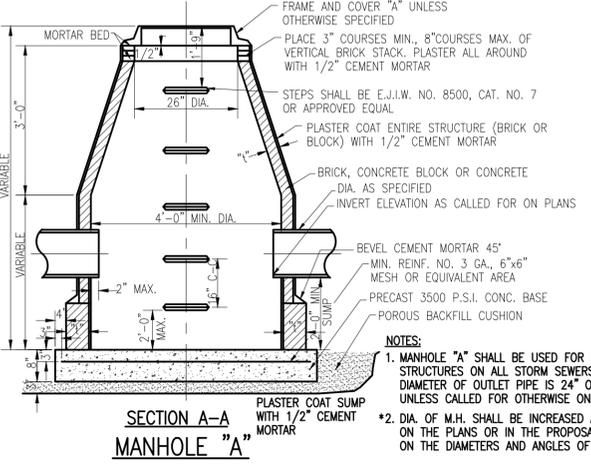
YPSILANTI TOWNSHIP / Y.C.U.A.
STANDARD STORM SEWER DETAILS

SHEET

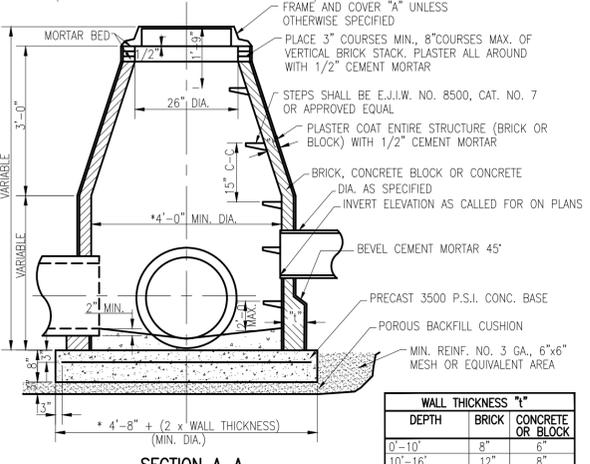
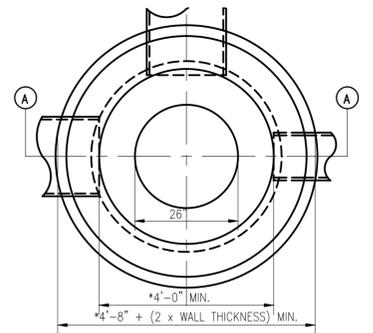
OF #



WALL THICKNESS "t"		
DEPTH	BRICK	CONCRETE OR BLOCK
0'-10"	8"	6"
10'-16"	12"	8"
16' & DEEPER	16"	12"

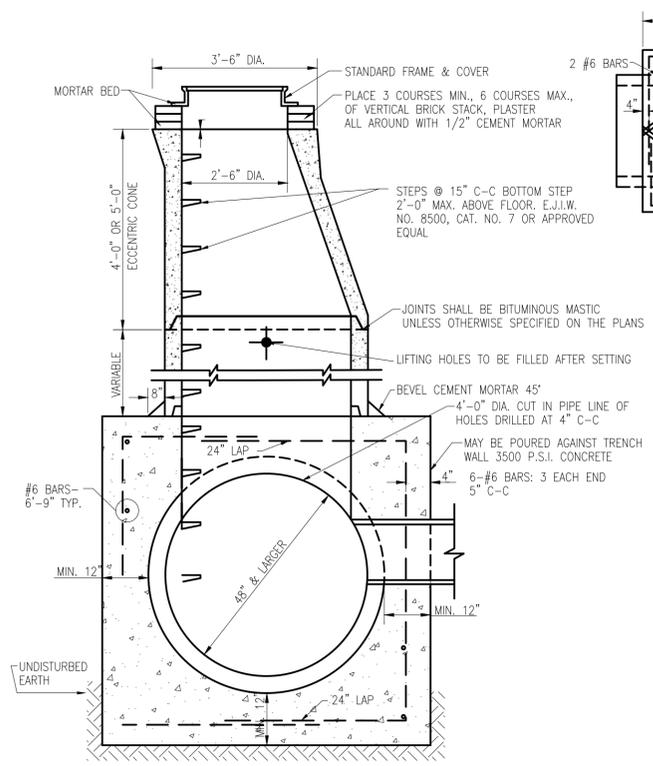


NOTES:
1. MANHOLE "A" SHALL BE USED FOR MANHOLE STRUCTURES ON ALL STORM SEWERS WHERE THE DIAMETER OF OUTLET PIPE IS 24" OR SMALLER, UNLESS CALLED FOR OTHERWISE ON THE PLANS.
*2. DIA. OF M.H. SHALL BE INCREASED AS SHOWN ON THE PLANS OR IN THE PROPOSAL DEPENDING ON THE DIAMETERS AND ANGLES OF THE SEWERS.



NOTES:
1. MANHOLE "B" SHALL BE USED FOR MANHOLE STRUCTURES ON ALL STORM SEWERS WHERE THE DIAMETER OF OUTLET PIPE IS 24" OR SMALLER, UNLESS CALLED FOR OTHERWISE ON THE PLANS.
*2. DIA. OF M.H. SHALL BE INCREASED AS SHOWN ON THE PLANS OR IN THE PROPOSAL DEPENDING ON THE DIAMETERS AND ANGLES OF THE SEWERS.

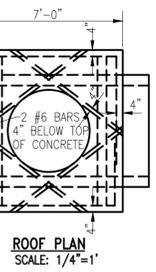
WALL THICKNESS "t"		
DEPTH	BRICK	CONCRETE OR BLOCK
0'-10"	8"	6"
10'-16"	12"	8"
16' & DEEPER	16"	12"



NOTES:
1. MANHOLE "C" SHALL BE USED FOR MANHOLE STRUCTURES ON ALL STORM SEWERS WHERE 48" OR LARGER DIA. PIPES INTERSECT.
2. PRECAST UNITS SHALL MEET THE REQUIREMENTS SPECIFIED BY A.S.T.M. C-478-68.

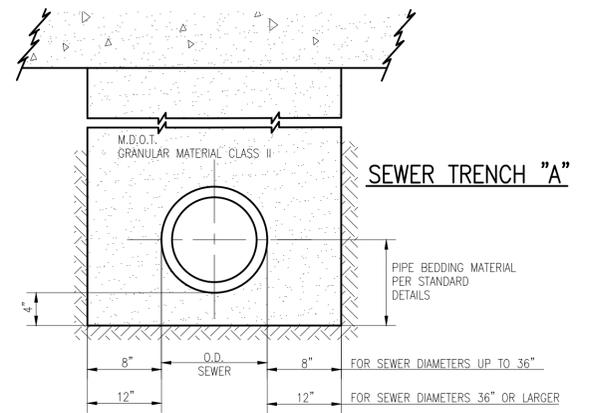
WALL THICKNESS "t"		
DEPTH	BRICK	CONCRETE OR BLOCK
0'-10"	8"	6"
10'-16"	12"	8"
16' & DEEPER	16"	12"

NOTES:
1. THIS MANHOLE SHALL BE USED ONLY WHEN MEETING CONDITIONS STATED IN THE "GENERAL MANHOLE NOTES", ITEM NO. 2A
2. PRECAST UNITS SHALL MEET REQUIREMENTS SPECIFIED BY A.S.T.M. C-478-68.
*3. DIAMETER OF MANHOLE SHALL BE INCREASED AS SHOWN ON PLANS OR IN THE PROPOSAL, DEPENDING ON THE DIAMETERS AND ANGLES OF THE SEWERS.

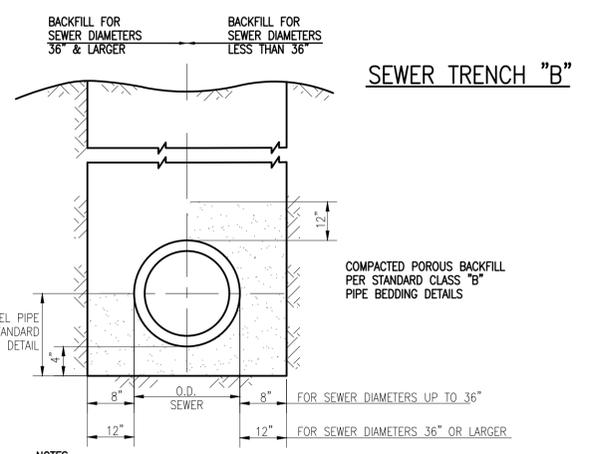


ROOF PLAN SCALE: 1/4"=1'

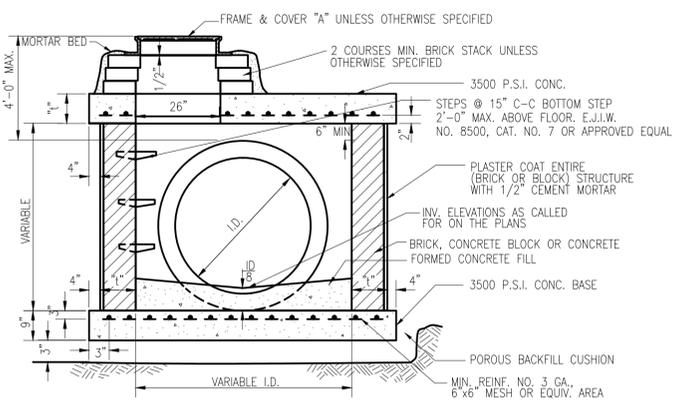
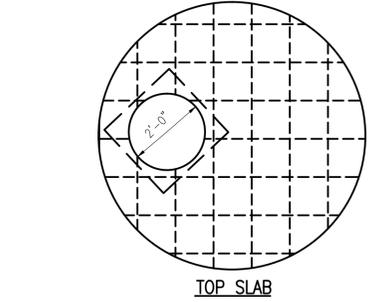
- GENERAL NOTES FOR STORM SEWER MANHOLES**
- ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF THE TOWNSHIP OF YPSILANTI AND YCUA.
 - CONTRACTOR SHALL CONSTRUCT MANHOLES WITH PRECAST REINFORCED CONCRETE UNITS ("E", "F", AND "I") IN LIEU OF CONCRETE, BRICK AND BLOCK MANHOLES ("A" AND "B") IN ACCORDANCE WITH THE FOLLOWING CONDITIONS:
 - MAXIMUM DIAMETER OF SEWER OUTLET IN ANY PRECAST UNIT SHALL BE 18" (MANHOLE "E" ONLY).
 - NO OPENINGS SHALL BE MADE IN PRECAST UNITS WHICH WOULD LEAVE LESS THAN 24" OF UNDISTURBED PRECAST PIPE OR WOULD REMOVE MORE THAN 30% OF THE CIRCUMFERENCE ALONG ANY HORIZONTAL PLANE.
 - STRUCTURES FOR SEWERS LARGER THAN 18", OR THOSE NOT MEETING THE OPENING REQUIREMENTS, SHALL BE BUILT OF BLOCK OR BRICK UP TO A MINIMUM OF 8" ABOVE THE TOP OF SEWER, WITH PRECAST UNITS BEING USED ABOVE THIS POINT. WHERE PRECAST UNITS REST ON THE BLOCK OR BRICK, THE GROOVE IN THE PRECAST UNIT SHALL BE FILLED WITH MORTAR.
 - OPENINGS FOR THE OUTLET SEWER SHALL BE PRECAST WITH A DIAMETER OF 3 INCHES LARGER THAN THE OUTSIDE DIAMETER OF THE OUTLET PIPE. ALL OTHER OPENINGS SHALL BE MADE IN THE FIELD AFTER MANHOLE HAS BEEN CONSTRUCTED.
 - ALL VERTICAL OPENINGS IN CONCRETE BLOCK STRUCTURE WALLS SHALL BE COMPLETELY FILLED WITH MORTAR. ALL VERTICAL WALL JOINTS SHALL BE CEMENT POINTED.
 - A "POURED 3500 P.S.I. CONCRETE BASE" WITHOUT STEEL REINFORCEMENT MAY BE SUBSTITUTED FOR PRECAST BASE WHEN APPROVED BY THE TOWNSHIP ENGINEER. A POROUS BACKFILL CUSHION WILL NOT BE REQUIRED UNDER THE POURED BASE UNLESS CONTRACTOR HAS EXCAVATED BELOW THE REQUIRED ELEVATION, AT WHICH TIME THE ENGINEER WILL DECIDE AS TO THE MERITS OF INCREASING THE THICKNESS OF THE CONCRETE BASE OR THE USE OF A POROUS BACKFILL CUSHION.
 - WHERE UNSTABLE GROUND CONDITIONS ARE ENCOUNTERED, SLAG OR STONE BEDDING SHALL BE USED AS DIRECTED BY THE ENGINEER IN ORDER TO PROVIDE A STABLE FOUNDATION FOR PIPE AND MANHOLES.
 - ALL PIPES ENTERING OR LEAVING A MANHOLE SHALL BE ADEQUATELY SUPPORTED BY POURING 2500 P.S.I. CONCRETE FILL FROM UNDISTURBED EARTH TO SPRINGLINE.
 - WHEREVER EXISTING MANHOLES OR SEWER PIPE ARE TO BE TAPPED, DRILL HOLES AT 4" CENTER TO CENTER AROUND PERIPHERY OR OPENING TO CREATE A PLANE OF WEAKNESS BEFORE BREAKING SECTION OUT.



NOTES:
1. TRENCH "A" SHALL BE USED UNDER ROAD SURFACES, PAVEMENT, SIDEWALK, CURB, AGGREGATE & PAVED DRIVES AND WHERE THE EDGE OF TRENCH IS WITHIN 3 FEET OF THE PAVEMENT
2. GRANULAR MATERIAL SHALL BE PLACED BY THE "CONTROLLED DENSITY METHOD" OR OTHER MEANS HAVING APPROVAL OF THE ENGINEER AND IS TO BE COMPACTED TO 95% OF MAXIMUM UNIT WEIGHT



NOTES:
1. SUITABLE EXCAVATED BACKFILL MATERIAL SHALL BE PLACED IN ONE FOOT LAYERS AND COMPACTED BY MECHANICAL TAMPING OR OTHER EFFECTIVE MEANS HAVING APPROVAL OF THE ENGINEER, TO A DENSITY EQUIVALENT TO THE UNDISTURBED ADJACENT SOIL.
2. TRENCH "B" SHALL BE USED UNDER CONDITIONS OTHER THAN SPECIFIED FOR TRENCH "A"

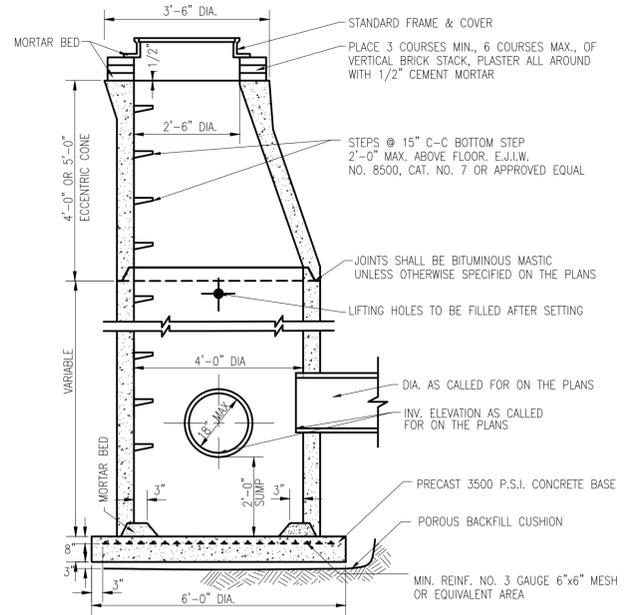


OUTLET I.D.	M.H. D	TOP SLAB "T"	WALLS "t"	REINFORCING STEEL (SLAB)
24" OR LESS	4'-0"	9"	8"	3/4" @ 9" EACH WAY
30"	4'-0"	9"	8"	3/4" @ 9" EACH WAY
36"	4'-0"	9"	12"	3/4" @ 9" EACH WAY
42"	4'-0"	10"	12"	3/4" @ 9" EACH WAY
48"	4'-0"	11"	12"	7/8" @ 9" EACH WAY
54"	4'-0"	11"	12"	7/8" @ 9" EACH WAY

M.H. D	TOP SLAB "T"	WALLS "t"	REINFORCING STEEL (SLAB)
7'-0"	12"	12"	7/8" @ 9" EACH WAY
8'-0"	12"	12"	1" @ 9" EACH WAY

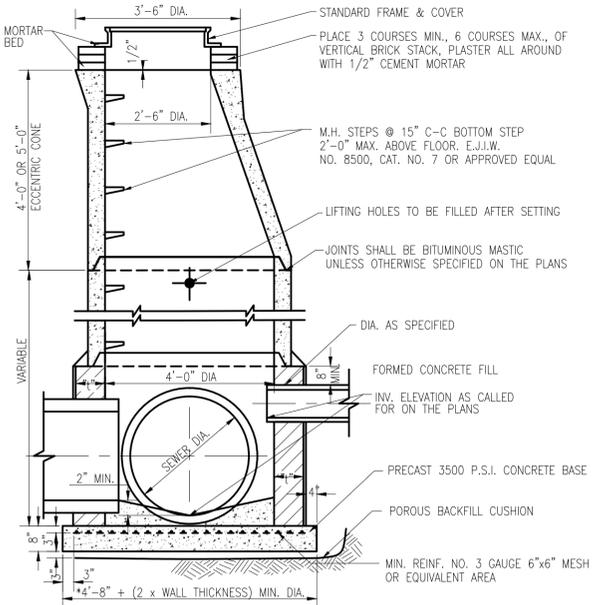
NOTES:
*1. DIA. SHALL BE INCREASED AS SHOWN ON PLANS OR IN THE PROPOSAL DEPENDING ON THE ANGLE OF THE SEWERS.
2. M.H. "D" SHALL BE USED WHERE THE DEPTH OF COVER FROM THE TOP OF CASTING TO THE TOP OF SEWER IS LESS THAN 4'-0". M.H. "D" SHALL BE CONSTRUCTED WITH A 2' SUMP WHERE DIAMETER OF OUTLET SEWER IS 24" OR LESS.

TYPICAL SECTION MANHOLE "D"



TYPICAL SECTION PRECAST MANHOLE "E"

NOTES:
1. THIS MANHOLE SHALL BE USED ONLY WHEN MEETING CONDITIONS STATED IN THE "GENERAL MANHOLE NOTES", ITEM NO. 2A
2. PRECAST UNITS SHALL MEET THE REQUIREMENTS SPECIFIED BY A.S.T.M. C-478-68.



TYPICAL SECTION PRECAST MANHOLE "F"

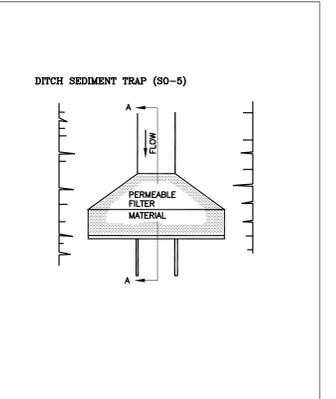
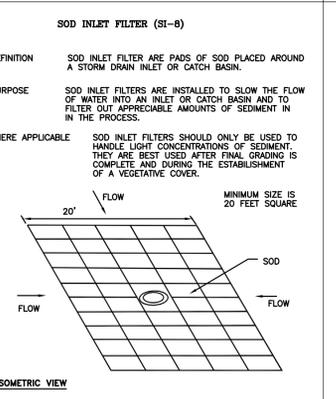
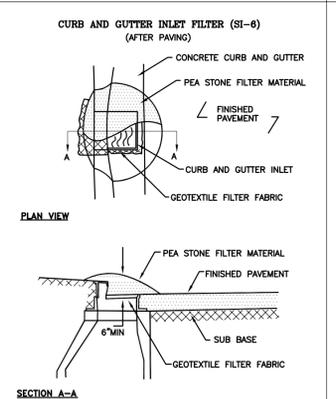
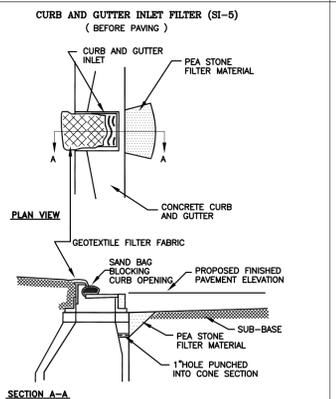
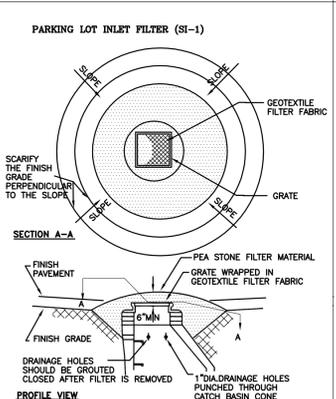
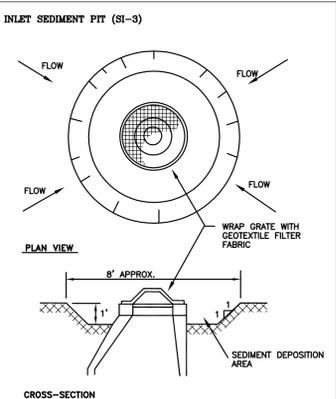
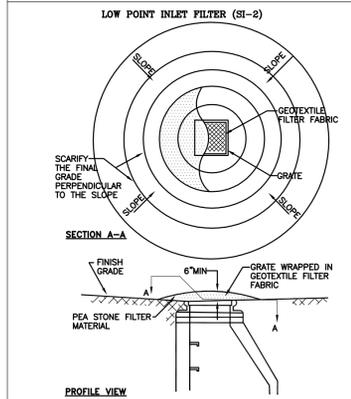
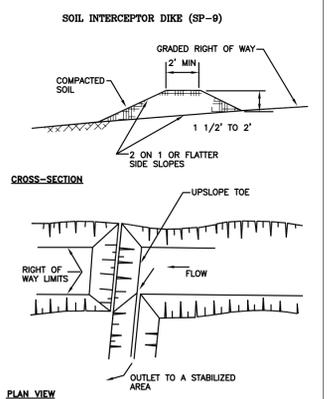
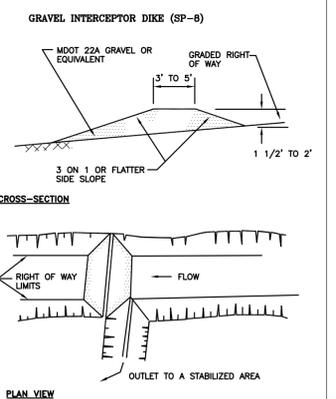
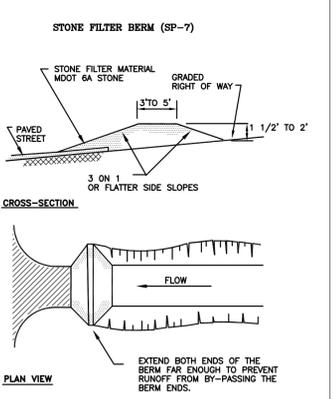
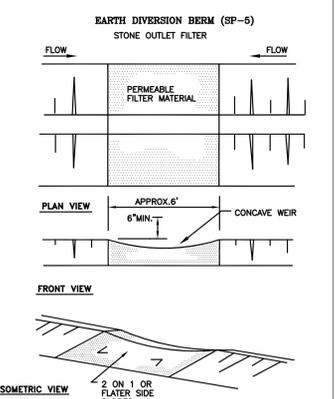
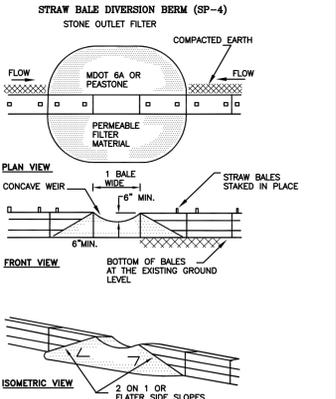
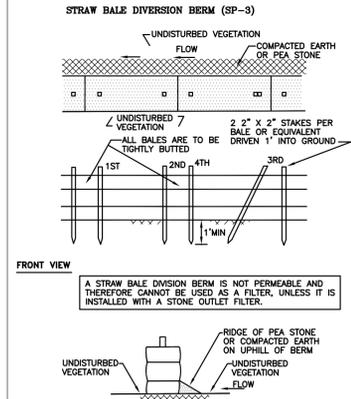
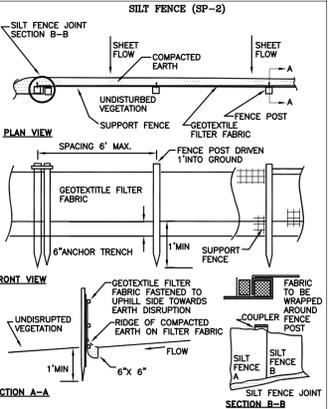
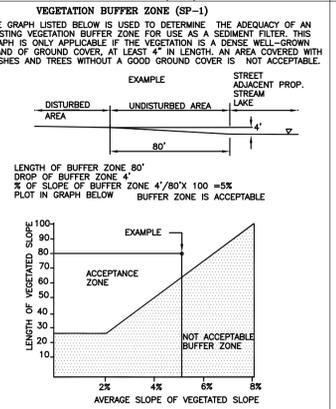
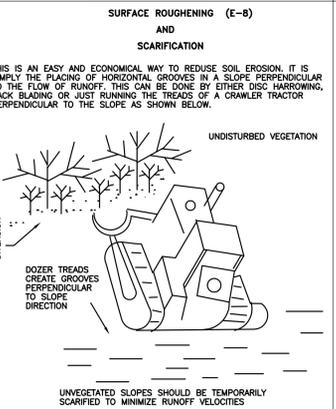
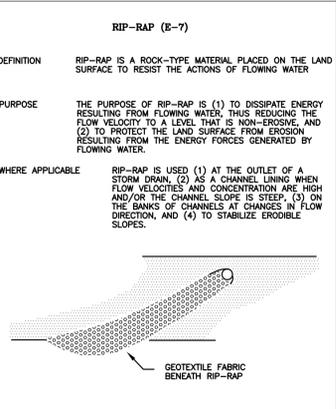
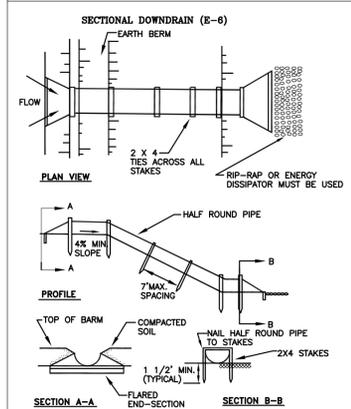
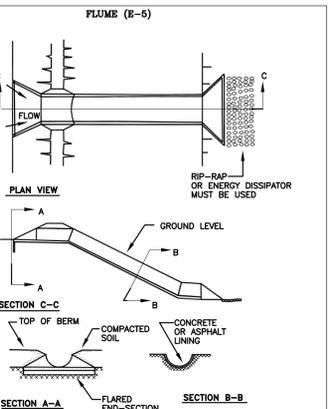
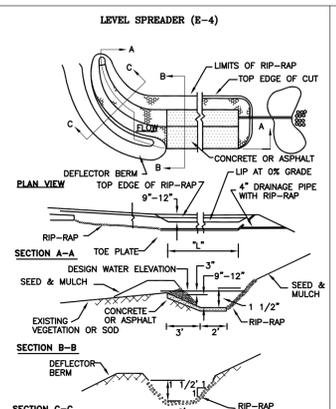
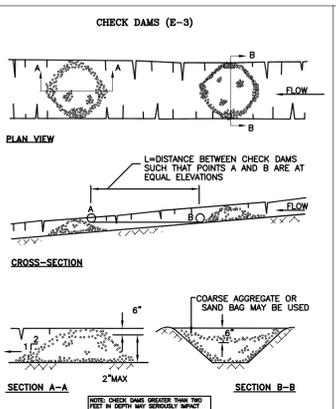
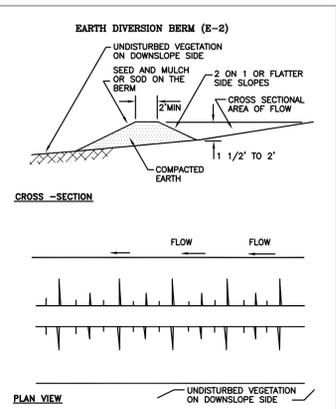
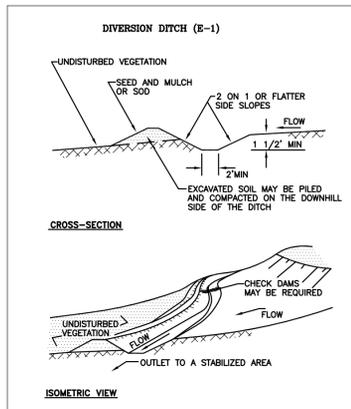
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RULE 323.1703
SOIL EROSION AND SEDIMENTATION CONTROL PLAN REQUIREMENTS.

A PERSON SHALL PREPARE A SOIL EROSION AND SEDIMENTATION CONTROL PLAN FOR ANY EARTH CHANGE IDENTIFIED IN R 323.1704. A PERSON SHALL DESIGN THE PLAN TO EFFECTIVELY REDUCE ACCELERATED SOIL EROSION AND SEDIMENTATION AND SHALL IDENTIFY FACTORS THAT MAY CONTRIBUTE TO SOIL EROSION OR SEDIMENTATION, OR BOTH. THE PLAN SHALL INCLUDE, BUT NOT BE LIMITED TO, ALL OF THE FOLLOWING:

- (A) A MAP OR MAPS AT A SCALE OF NOT MORE THAN 200 FEET TO THE INCH OR AS OTHERWISE DETERMINED BY THE COUNTY OR LOCAL ENFORCING AGENCY. A MAP SHALL INCLUDE A LEGAL DESCRIPTION AND SITE LOCATION SKETCH THAT INCLUDES THE PROXIMITY OF ANY PROPOSED EARTH CHANGE TO LAKES OR STREAMS, OR BOTH; PREDOMINANT LAND FEATURES; AND CONTOUR INTERVALS OR SLOPE DESCRIPTION.
- (B) A SOILS SURVEY OR A WRITTEN DESCRIPTION OF THE SOIL TYPES OF THE EXPOSED LAND AREA CONTEMPLATED FOR THE EARTH CHANGES.
- (C) DETAILS FOR PROPOSED EARTH CHANGES, INCLUDING ALL OF THE FOLLOWING:
 - (i) A DESCRIPTION AND THE LOCATION OF THE PHYSICAL LIMITS OF EACH PROPOSED EARTH CHANGE.
 - (ii) A DESCRIPTION AND THE LOCATION OF ALL EXISTING AND PROPOSED ON-SITE DRAINAGE AND DEWATERING FACILITIES.
 - (iii) THE TIMING SEQUENCE OF EACH PROPOSED EARTH CHANGE.
 - (iv) THE LOCATION AND DESCRIPTION FOR INSTALLING AND REMOVING ALL PROPOSED TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES.
 - (v) A DESCRIPTION AND THE LOCATION OF ALL PROPOSED PERMANENT SOIL EROSION AND SEDIMENTATION MEASURES.
 - (v) A PROGRAM PROPOSAL FOR THE CONTINUED MAINTENANCE OF ALL PERMANENT SOIL EROSION AND SEDIMENTATION CONTROL MEASURES THAT REMAIN AFTER PROJECT COMPLETION, INCLUDING THE DESIGNATION OF THE PERSON RESPONSIBLE FOR THE MAINTENANCE. MAINTENANCE RESPONSIBILITIES SHALL BECOME A PART OF ANY SALES OR EXCHANGE AGREEMENT FOR THE LAND ON WHICH THE PERMANENT SOIL EROSION CONTROL MEASURES ARE LOCATED.



REVISIONS:	ISSUE NO.	BID DATE
	B.G. DRN.	DATE
	TOPO DRN.	DESIGN
	PROFILE DRN.	ENG. DRN.
	APPROVED	SCALE
	V:	H: NTS

YPSILANTI TOWNSHIP
TOWNSHIP STANDARD
SOIL EROSION CONTROL DETAILS

ORCHARD, HILTZ & McCLIMENT, INC.

3400 Plymouth Road
Livonia, MI 48150
(734) 522-6711
(734) 522-6427 FAX

CLIENT: YPSILANTI TOWNSHIP

CLIENT: YPSILANTI TOWNSHIP
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JOB #