VILLAGE OF MT. ORAB, OHIO
Subdivision Regulations

ADOPTED BY THE
Village of Mt. Orab, Ohio Village Council
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Acknowledgements and Intent:

The Village of Mount Orab would like to thank the City of Loveland for allowing the Village of Mt Orab utilization of the City of Loveland Subdivision Regulations dated 1/18/2019.

The intent of these regulations is to provide the developers, construction professionals, building professionals, citizens, and all other users with similar regulations for the region. Many differences are historical.

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SECTION 1. GENERAL PROVISIONS

1.1 Title

These regulations shall officially be known, cited, and referred to as the Subdivision Regulations of the Village of Mt. Orab.

1.2 Purpose and Scope

These Subdivision Regulations for the Village of Mt. Orab, Brown County, Ohio, as provided for in Chapter 711 of the Ohio Revised Code, are intended to govern the control of the subdivision of land within the jurisdiction of the Mt. Orab Planning Commission, the preparation of plats of such subdivisions and the splitting of lots; improvement requirements; and standards of design. They are designed to provide and promote adequate and convenient traffic flow, coordination of layout, proper arrangement of streets, adequate provision of potable water and sewage treatment, adequate space for light and air, access for fire, police, and other emergency vehicles, and ensure provision for storm water management and various other facilities so as to ensure an integrated development of the Village and to promote the health, safety, and general welfare of the citizens of the Village and surrounding areas.

1.3 Territorial Limits of Regulations

The rules and regulations governing plats and subdivisions of land contained herein shall apply within the corporate limits of the Village of Mt. Orab, Ohio.

1.4 Authority

The Planning Commission of Mt. Orab, Ohio is hereby designated as the land use authority for the Village and is charged with the duty of approving regulations and making investigations and reports on the design and improvement of proposed subdivisions; and is hereby authorized to approve or disapprove plats of subdivisions, prepared and filed in accordance with the provisions of these regulations.

1.5 Interpretation of Standards

In their interpretation and application, the provisions of these regulations shall be held as minimum requirements. Wherever these regulations impose a greater restriction than is imposed or required by other provisions of law or by other rules, regulations or ordinances, the provisions of these regulations shall apply.

1.6 Severability

Should any section or provision of these regulations be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of these regulations as a whole, or any part thereof other than the part so declared to be unconstitutional or invalid.

SECTION 2. DEFINITIONS

2.1 Definitions

For the purpose of these regulations, certain terms are defined as follows:

2.1.1 Administrative Official(s) Governing Zoning, Building, Engineering, and Public Works Regulations

The administrative official(s) governing zoning, building, engineering, and public works regulations or his/her designee as appointed by the Mayor of the Village of Mt. Orab.

2.1.2 Block

In describing the boundaries of a district, the work *block* refers to the legal description. In all other cases the word *block* refers to the property abutting on one side of a street between two intersection streets or a street and a railroad right-of-way or watercourse.

2.1.3 Building Line

The line, parallel to the street line, beyond which no building or part thereof shall project.

2.1.4 Developer

Any individual, firm, association, corporation, trust, or any other legal entity, which commences proceedings under these regulations to subdivide land within the Village of Mt. Orab, Ohio. In these regulations, the term *Developer* shall mean only the individual or individuals who have a controlling equity or financial interest in the firm, association, corporation, trust or legal entity nominally designated as the Developer of the proposed subdivision.

2.1.5 Easement

A grant by the property owner to the public, a corporation, or persons, of the use of a strip of land for specific purposes.

2.1.6 Engineer

A registered, licensed professional civil engineer in good standing in the State of Ohio.

2.1.7 Improvements

Include, but are not limited to, grading, street resurfacing, curbs and gutters, sidewalks, crosswalks, pedestrian ways, permanent street monuments, culverts, bridges, water and sanitary and storm sewer lines, landscaping, streetlights, signs, and other appropriate items.

2.1.8 Lot

A piece of land occupied or intended to be occupied by a principal building, or group of buildings and accessory buildings, or utilized for a principal use and accessory uses thereto, together with such open spaces required, and having frontage on a public street.

2.1.9 Lot, Corner.

A lot abutting on two or more streets at their intersection or on two parts of the same street, such streets or parts of the same street forming an interior angle of less than 135 degrees. The point of intersection of the street lines is the corner.

2.1.10 Lot, Double Frontage.
A lot other than a corner lot, that abuts on to more than one street.

2.1.11 Lot, Flag.
A lot also known as a "rear lot" or a "panhandle lot" which utilizes a narrow strip of land or stem to provide access to, or legal frontage on, a public street or private street. The panhandle of such lot is not considered a building site, nor is the area of such included in calculating the lot area.

2.1.12 Lot Split
Any division of land into two or more parcels for the purpose, whether immediate or future, of transfer or of ownership, with no public improvements, and which does not constitute a subdivision as herein defined.

2.1.13 Monument
A permanent concrete or iron marker used to accurately define all lines of the plat of a subdivision including all lot corners and boundary line corners.

2.1.14 Open Space
Land used for resource protection, recreation, amenity, and/or buffers.

2.1.15 Planning Commission
The Village of Mt. Orab's Planning Commission.

2.1.16 Plat, Record
The plan and any accompanying required data of Section 8: Record Plat Requirements of these regulations. The Record Plat is to be submitted to the county in which it is located for recording.

2.1.17 Plat, Preliminary
The map or drawing on which the layout and design of the subdivision conforms to Section 6: Preliminary Plat Requirements of these regulations.

2.1.18 Pedestrian Way
An intrablock right-of-way dedicated to public use, which cuts through a block to facilitate pedestrian access to adjacent streets and properties.

2.1.19 Reproducible Copy
A copy produced in PDF format or a similar and approved accepted substitute from which high- quality direct process prints can be made.

2.1.20 Resource Protection
The preservation or conservation of natural features of the land which shall include, but is not limited to, waterways, floodplains, slopes, forested areas, wetlands, meadows, and lakes.

2.1.21 Right-of-Way
Land dedicated to or owned by the public for use as a roadway, walk, or other way.

2.1.22 Roadway Width

Also called Surface Width, shall mean that portion of any street designated for vehicular traffic and, where curbs are laid, that portion of the street between curbs, measured from back of curb to back of curb.

2.1.23 Street

A public right-of-way which provides a public means of access to abutting properties for motor vehicles. For the purposes of these regulations, streets shall be classified as follows:

A. **Arterial Street.** A street which is intended to carry large volumes of traffic from one section of the Village to another, or to outside the Village limits.

B. **Collector Street.** A street intended primarily to carry traffic from local streets to major streets. May serve as main circulation streets within large residential neighborhoods and/or may provide direct access to industrial parks. They may or may not be through streets.

C. **Local Street.** A street intended primarily to provide access to abutting properties.

D. **Cul-de-sac.** A street having one end open to traffic and being terminated at the other end by a vehicular turn-around.

E. **Dead-end Street.** A local street temporarily having only one outlet open to vehicular traffic and not provided with a turn-around.

2.1.24 Subdivision

The division of any parcel of land shown as a unit or as contiguous units on the last preceding tax roll, into two or more parcels, sites, or lots, any one of which is less than five acres for the purpose, whether immediate or future, of transfer of ownership.

However, the division or partition of land into parcels of more than five acres not involving any new streets or easements of access, and the sale or exchange of parcels between adjoining lot owners where such sale or exchange does not create additional building sites, shall be exempted.

Subdivision shall also mean the improvement of one or more parcels of land for residential, business, or industrial structures, or groups of structures, involving the division or allocation of land for the opening, widening, or extension of any street or streets, except private streets serving industrial structures or the division or allocation of land as open spaces for common use by owners, occupants, or lease holders; or as easements for the extension of maintenance of public sewer, water, storm drainage, or other public facilities.

2.1.25 Surveyor

A person registered and licensed to practice land surveying by the Ohio State Board of Registration.

2.1.26 Variance

A modification of the strict terms of the relevant regulations where such modification will not be contrary to the public health, safety, or welfare and where owing to conditions peculiar to the property and not the result of the action of the applicant.

2.1.27 Zoning Code

The official Zoning Code of the Village of Mt. Orab, Ohio, including all accompanying maps and amendments thereto.

SECTION 3. PROCEDURES

3.1 General

No construction work on proposed subdivisions, including grading or site clearing, by any person, firm, or corporation, shall proceed until the Planning Commission has granted approval of the Preliminary Plat and Improvement (Construction) plan.

3.2 Compliance with Design Principles Required

In planning and developing a subdivision the Developer shall comply with the general principles of design and the minimum requirements for the layout of a subdivision as set forth in Section 5: Subdivision Design Standards of these regulations, and with the rules and regulations concerning required improvements set forth in Section 4: Required Improvements of these regulations.

3.3 Submission Fees

All applications for development shall be charged according to the associated fee schedule and shall be paid to the Village prior to any advancement to the next phase of the development process.

3.4 Subdivision Procedures

The subdivision procedure, in every case, shall pursue the following steps and which are further explained in the following sections:

A. Pre-Application Meeting

B. Preliminary Plat Submission and Approval

C. Construction Drawings

D. Construction Drawings to Improvement (Construction) Plan

E. Subdivision Acceptance

3.5 Pre-Application Meeting

The pre-application meeting is intended to provide:

A. The Developer with an opportunity to understand the Village's requirements; such as:

   1. Zoning and land use restrictions;
   2. Review of the development approval process;
   3. Review of pertinent State Statutes, Village Ordinances and/or Resolutions; and
   4. Other items which may be relevant to the proposed development as deemed necessary by Village Staff and/or the Developer.

B. For the Village to assist the Developer in successfully implementing their development before the Developer incurs the expense and time involved in preparing Preliminary and/or Record Plats.

This review does not create any vested rights to proceed with development in any particular configuration. Developers may anticipate that the Village may raise other issues not addressed at the pre-application meeting stage later in the development review process.

3.6 Preliminary Plat

The Developer shall prepare a Preliminary Plat of the proposed subdivision which shall conform with the requirements set forth in Section 6: Preliminary Plat Requirements. The Developer shall file the Preliminary Plat and associated documentation with the Zoning Department and Village Engineer before the cutoff date for the next regularly scheduled meeting of the Planning Commission, as established by the Village Zoning Department, and/or Village Engineer.

3.6.1 Review of Preliminary Plat

The Planning Commission will review the Preliminary Plat as to its conformity with the Zoning Code, and Subdivision Regulations. Copies of said Preliminary Plat will be referred by the Planning Commission for recommendations or other action, to the administrative official(s) governing zoning, building, engineering, and public works regulations, Fire Department, and Police Department, for the review of all items within their jurisdiction including construction plans of the proposed improvements.

3.6.2 Approval or Denial by the Planning Commission

Upon receipt of the recommendations and advice of action concerning matters covered in the preceding paragraph, the Planning Commission shall, within 35 days, approve or deny the Preliminary Plat, or approve it with modifications, noting thereon any changes that will be required. Within the said 35-day period, a majority of the members of the Planning Commission present at a meeting thereof may vote to extend the said period for a period not to exceed an additional 60 days. One reproducible copy will be returned to the Developer and one reproducible copy shall be retained by the Village with the date of said approval or disapproval endorsed thereon.

The approval of the Preliminary Plat by the Planning Commission is to be considered only as an approval of the layout, with the understanding that the official(s) governing zoning, building and floodplain, or other officials having jurisdiction may modify any engineering or construction details proposed by the Developer, whenever required for the protection of public interest.

3.6.3 Preliminary Plat Expiration

Approval of the Preliminary Plat shall be effective for a period of two years from the date that said plat was approved by the Planning Commission, unless an extension of time is granted by the Planning Commission for good cause. If no construction has begun within two years from the date of Planning Commission approval, the approval shall lapse. At least 30 percent of the total construction costs shall be incurred by the Developer to define the start of construction. Upon expiration of the time limit, the Preliminary Plat shall be resubmitted in accordance with the Preliminary Plat procedures and requirements.

Any request from a Developer for an extension of the effective period for a Preliminary Plat over and beyond that as set forth in the paragraph above, shall be granted only if the Planning Commission determines that the Developer is proceeding in a satisfactory manner with the installation of the required improvements. An extension of a Preliminary

Plat, as provided for in this Subsection, shall be for a period not to exceed one year, provided that during the one year extension period, the Developer must meet all applicable rules and regulations, current and in force, during that one year period, including, but not restricted to the Subdivision Regulations and all provisions of the Mt. Orab Zoning Code.

3.7 Improvement (Construction) Plans

Construction Plans shall be submitted to the Village for review and approval, in accordance with Section 4.13: Improvement (Construction) Plans, prior to the Developer submitting a Record Plat. Following Village Staff's approval of the Construction Plans and finalization of the financial agreement, the Developer may begin installation of the public improvements as identified on the Preliminary Plat and the Improvement (Construction) Plans.

3.8 Development Agreement

To ensure the proper construction and installation of all improvements required by these regulations, the Developer shall execute a Development Agreement in a form prepared by the Village and approved by the Village Council and the Planning Commission.

This agreement shall provide that all required improvements shall be constructed and installed at the Developer's expense in compliance with the standards and specifications for each of the various types of improvements; and that such improvements will be completed within two years from the date of approval of the Preliminary Plat. Such agreement shall also contain a provision whereby the Developer warrants to the Village of Mt. Orab, for a period of one year from the date all improvements have been completed, that all the said subdivision improvements are constructed in an acceptably suitable proficient manner in accordance with the Construction and Material Specifications of the Village of Mt. Orab and are free from defects in construction and materials. The said warranty shall survive the approval of the Record Plat by the Planning Commission, and the acceptance and recording of such plat by the Village of Mt. Orab. Any further provisions that the Planning Commission, Mayor, Zoning Administrator, or administrative official(s) governing zoning, building, engineering, and public works regulations deem necessary in the public interest may be added to the Development Agreement.

The Development Agreement shall further provide that where the improvements are not completed within the specified period, the Village of Mt. Orab may complete the improvements and recover full costs and expenses thereof from bonds posted by the Developer for the faithful performance of such work.

No construction of any improvements or clearing and grading shall be commenced prior to the approval of the Development Agreement.

3.9 Record Plat

Upon completion of all improvements required by these regulations, the Developer shall file with the Zoning Department and Village Engineer, the Record Plat of the subdivision and associated documentation for final approval, as set forth in Section 8: Record Plat Requirements. A subdivision which has preliminary approval may be developed in sections and a Record Plat for each section may be submitted to the Zoning Department and Village Engineer for approval.

The Developer shall be responsible for the recording of the approved Record Plat with the corresponding County Recorder's office. The Developer shall provide the Village with one electronic copy and one hard copy of the approved recorded plat within one week of its recorded date.

3.9.1 Review of the Record Plat

The administrative official(s) governing zoning, building, engineering, and public works regulations will review the Record Plat and compose a written statement showing that the technical details of the plat itself have been checked and found satisfactory, and that all required improvements have been satisfactorily completed. Such statement, in conjunction with the Record Plat, will be forward to the Planning Commission for their consideration.

3.9.2 Inspection of Improvements

Before approval of the Record Plat by the Planning Commission, the administrative official(s) governing zoning, building, engineering, and public works regulations shall cause a final inspection to be made of the subdivision improvements covered by such plat, in order to determine whether such subdivision improvements have been constructed in accordance with the Village of Mt. Orab, Brown County, and the Ohio Department of Transportation Construction and Material Specifications and in accordance with the Preliminary Plat, Improvement (Construction) Plans, and other plans or specifications for such improvements previously submitted by the Developer and/or required by the Planning Commission or the Village of Mt. Orab.

If, upon inspection, the administrative official(s) governing zoning, building, engineering, and public works regulations finds that the said subdivision improvements have been satisfactorily completed in accordance with the foregoing, he/she shall so certify to the Zoning Department and Village Engineer in a written inspection report. If the administrative official(s) governing zoning, building, engineering, and public works regulations finds that the subdivision improvements have not been so completed in any respect, he/she shall fully and accurately describe the deficiencies in completion to the Zoning Department and Village Engineer in the written inspection report. Thereafter, the Zoning Department and Village Engineer shall notify the Developer of such deficiencies, in writing, and shall stipulate a reasonable period, not to exceed one year, in which such deficiencies shall be corrected by the Developer. Any extensions of the minimum time limit for completion of the subdivision improvements, together with any extensions of any performance bond required by these regulations, shall be stipulated and required by the Zoning Department and Village Engineer in its notice of such deficiencies to the Developer.

3.9.3 Approval or Denial of the Record Plat

Upon receipt of the written statement of the administrative official(s) governing zoning, building, engineering, and public works regulations provided for in Section 3.9.1, a satisfactory written inspection report as provided for in Section 3.9.2 certifying that the subdivision improvements have been satisfactorily completed, and provided that the Record Plat is found to conform with the Preliminary Plat as approved, the Planning Commission shall approve the Record Plat within 35 days and shall enter such approval thereon in writing by its chairman and secretary.

3.9.4 Effect of Approval of Record Plat by the Planning Commission

Neither satisfactory written inspection report by the administrative official(s) governing zoning, building, engineering, and public works regulations as provided in Section 3.9.2 hereof, nor the approval of the Record Plat by the Planning Commission as provided in Section 3.9.3 hereof, shall be deemed to constitute or effect an acceptance by the Village of Mt. Orab of the subdivision improvements covered by such plat or inspection report, or a waiver or estoppel to assert the Developer's warranty contained in the Development Agreement provided for in Section 3.8: Development Agreement of these regulations.

3.9.5 Warranty Period

The Developer shall request, in writing, the commencement of the one-year warranty period. The Developer shall maintain and keep in repair all required improvements in accordance with these standards for one year from the date that all improvements have been completed and approved. Repairs and inspections may be required. Developer may request a punch-list inspection indicating that all of the public improvements have been satisfactorily completed and maintained. Throughout the one-year warranty period, the Developer is responsible for the maintenance and repair of all public improvements, pothole repairs, water main leaks, and similar elements.

After the one-year warranty period, the administrative official(s) governing zoning, building, engineering, and public works regulations will examine all improvements and, if found to be constructed and/or installed correctly, and in satisfactory condition, the administrative official(s) governing zoning, building, engineering, and public works regulations will recommend that the improvements be accepted for maintenance and ownership by the Village. If the improvements are found to be in need of repair, said recommendation will not be made until after repairs have been completed by the Developer.

3.10 Subdivision Acceptance

Subdivision acceptance is determined by Village Council through Ordinance for the dedication of the development's public improvements to the Village. Upon subdivision acceptance by Village Council, the Village will assume full responsibility for ownership and maintenance of improvements.

To receive subdivision acceptance after the one-year warranty period has expired, the Developer shall request, in writing, that the subdivision be accepted by Village Council. The administrative official(s) governing zoning, building, engineering, and public works regulations shall inspect the improvements and certify that they have been properly installed and that they meet the adopted Village standards. Once all the improvements have been examined and, if found to be constructed and/or installed correctly and in satisfactory condition, Village staff shall make a recommendation for subdivision acceptance to the Village Council. Repairs and re-inspections may be required.

SECTION 4. REQUIRED IMPROVEMENTS

4.1 Improvements Installation

All the subdivision improvements required under these regulations and delineated on the Preliminary Plat shall be constructed within the time specified in Section 3: Procedures of these regulations prior to filing with the Planning Commission for Record Plat approval.

4.2 Inspections

Prior to starting any of the work covered by the Preliminary Plat, the Developer shall have arranged for the Village to conduct the necessary inspections to ensure that the work, in the opinion of the administrative official(s) governing zoning, building, engineering, and public works regulations, is compliant with the plans and specifications as approved. The administrative official(s) governing zoning, building, engineering, and public works regulations shall provide written approval indicating that the Developer can start the work.

4.3 Street Construction

Streets shall be graded to full width of the right-of-way and fully constructed with all-weather surfacing, including concrete curb and gutter or roadside swales and proper storm drains, inlets, and/or culverts as per the Village's specifications and the Ohio Department of Transportation (ODOT) standards.

4.4 Sidewalks

Sidewalks and curb ramps of such width and type of construction, as required by the Village's specifications and ADA regulations, shall be constructed on both sides of every street except where, in the opinion of the administrative official(s) governing zoning, building, engineering, and public works regulations, they are not necessary or appropriate due to topography, natural features, site conditions, or other similar elements.

4.5 Sanitary Sewer

Every subdivision shall be provided with a public sanitary sewer adequate to serve the area being platted into lots. All public sanitary sewer improvements shall be designed, constructed, and installed in accordance with the standards and specification of the Village of Mt. Orab Utility Department.

4.6 Water Supply

Every subdivision shall be provided with a drinking and fire protection water system adequate to serve the area being platted into lots. The subdivision shall be provided with a complete loop type water distribution system. Connection to water mains through adjacent properties to complete loops may be necessary. All water improvements shall be designed, constructed, and installed in accordance with the standards and specifications of the Village of Mt. Orab, Ohio, the Ohio Environmental Protection Agency (OEPA), and the Ten States Standards from the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (GLUMRB).

4.7 Stormwater Management System

Every subdivision shall provide for necessary stormwater management system, including conveyance, detention/retention, and stormwater quality treatment system sufficient to serve

the area being platted. Stormwater management systems shall be designed, constructed, and installed in accordance with the standards and specifications of the Village of Mt. Orab, Ohio as identified in Section 5.9: Stormwater Management System and elsewhere in these regulations and OEPA regulations. Permits may be necessary from not only OEPA, but also the Federal Emergency Management Agency (FEMA), the Ohio Department of Natural Resources (ODNR), and the United States Army Corps of Engineers (USACE).

4.8 Street Trees and Landscaping Along Roadways

When a proposed development abuts a road, streetscape landscape buffering shall be located along the property lines which adjoin the road. The streetscape landscape buffering area shall include street trees, earthen berming, consistent decorative fencing, hedging, evergreen or deciduous plant materials, or any combination thereof as deemed appropriate by the zoning administrator. The plantings provided pursuant to this section may be credited toward any applicable landscaping requirements per the zoning code.

The Developer shall submit a landscape plan identifying the location, quantity, size, and type of landscaping utilized in the streetscape landscape buffer area to be reviewed and approved by the Village Zoning Department and/or Village Engineer.

4.9 Street Lighting and Districts

The Developer shall install street lighting fixtures, wiring, and poles in accordance with the standards and specifications of the administrative official(s) governing zoning, building, engineering, and public works regulations and utility company, unless waived by the Planning Commission. The Developer shall pay all costs of construction for all street lighting.

The Developer may establish street lighting districts to assist with the costs associated with lighting on and around public streets, highways, parks, and alleys.

4.10 Traffic Control

Traffic control signs, pavement markings, and traffic signals shall be installed, by the subdivider, in accordance with the specifications of the administrative official(s) governing zoning, building, engineering, and public works regulations and the Ohio Manual of Uniform Traffic Control Devices (OMUTCD).

The Village will not be responsible for street signs or post maintenance if decorative street signs are installed by the Developer. If decorative street signs are provided, the subdivision's Home Owner's Association (HOA) is responsible for continued maintenance and replacement.

4.11 Electric, Telephone Lines, and Television Cable

In all subdivisions, underground electric current, telephone lines, telephone cables, fiber optic cables, and other similar utilities shall be buried in accordance with the specifications and standards set forth by the appropriate utility company.

Electric current for street lighting shall be supplied through underground cables in accordance with the specifications and standards set forth by the utility company.

4.12 Monuments

Permanent monuments shall be placed at all points on boundary lines where there is a change in the direction of the boundary of the tract to be subdivided, and other monuments shall be placed

at each intersection of all center lines and at the beginning and end of directional curves.

A permanent monument shall be concrete with a minimum size of six inches by six inches, or six inches in diameter by 30 inches in length with a reinforcing bar or pipe cast in the center. The other monuments shall be a one inch in diameter solid iron pin, no less than 36 inches in length. The top of all permanent markers shall not extend above the finished grade.

4.13 Improvement (Construction) Plans

Improvement (Construction) Plans and other applicable engineering data and construction specifications shall be prepared and certified by a professional engineer registered in the State of Ohio in accordance with the specifications of the Village of Mt. Orab. Such plans shall be submitted to the administrative official(s) governing zoning, building, engineering, and public works regulations for review and shall receive approval of these plans before improvements are installed. Improvement (Construction) Plans shall include the following:

A. A general statement describing proposed improvements and drainage systems.

B. The centerline profile (and original ground profile) of each proposed street at the following scale of 1”= 50 feet (horizontal) and 1”=10 feet (vertical) unless larger scale is needed to emphasize or highlight a design.

C. The cross-section of each proposed street, showing the width of pavement, the location and width of sidewalks, the location and size of utility mains, and the right-of-way.

D. The plans and profiles of proposed sanitary sewers and laterals, with grades and sizes indicated, or method of sewage disposal in lieu of sewers.

E. A plan of the proposed water distribution system, showing pipe sizes and the location of valves and fire hydrants, service lines, and meters.

F. A drainage, detention/retention, and stormwater quality systems plan showing all existing and proposed storm sewers, manholes, catch basins, water courses, culverts, and other underground structures within the tract and immediately adjacent thereto, with pipe sizes, grades, and waterway openings indicated thereon. The drainage plan shall show the method to be used for the adequate disposal of stormwater, including drainage outlets, drainage area maps and calculations, and such other data as may be required by the administrative official(s) governing zoning, building, engineering, and public works regulations.

   The plan shall be prepared and made a part of the construction drawings for the total development, showing the intended drainage from individual lots as well as the total development. The plan shall coordinate the needs for proper drainage and aesthetics of the total development. Positive surface drainage shall be provided for the total development, along with an overland flow path that prevents structural flooding in the event that the storm sewer system is inundated or obstructed.

G. A grading plan showing all existing and proposed contours, trees, and vegetation to be removed, and erosion control methods shown. The plan shall also indicate the location of all soil borings and be accompanied by a soil report prepared by a competent Soil Engineer stating existing conditions and recommendations for the

construction of the required improvements and future structures.

When the topography is changed to a higher or lower level than the natural grade, suitable slopes (slopes which do not exceed a one-foot vertical rise in a three-foot horizontal run (3:1)) or measures shall be provided to blend the changed contour in with the surroundings. The grading from the natural contour shall not impede the natural flow of storm drainage. Grading shall be done so that the amount of existing storm drainage (run off) to adjoining properties is not increased nor is it concentrated or spill off the property at new locations. Proper considerations shall be given to maintaining acceptable housekeeping or standard of cleanliness and neatness of site during and after development. The site shall not be used as a waste area for construction debris. In case of on-site excess earthen materials, the wasting of such shall be in a manner which will be compatible with the general grading or drainage plans. The piling or dumping of such material without spreading or distribution shall not be permitted.

4.14 "As Built" Construction Drawings

Upon completion of construction, reproducible PDF copies of the "as built" construction drawings for improvements installed along with copies of the construction notes and records from which the "as built" drawings were made, shall be provided to the Village of Mt. Orab. "As built" drawings shall include the following:

4.14.1 Centerline Profile

The centerline profile (and original ground profile) of each street at a scale of 20 feet or less to the inch with final percent of grade indicated. The survey for the centerline profile shall be performed after the final course has been installed on the roadway.

4.15.2 Sanitary Sewer

The plan and profile of all sanitary sewers constructed indicating size, grade, and all manhole inverts referenced to U.S.G.S. datum or as may be require. All lateral branches shall be referenced to visible permanent physical features as to location, length, and depth as required by the administrative official(s) governing zoning, building, engineering, and public works regulations.

4.14.3 Stormwater Management System

The plan and profile of all storm sewers, stormwater quality systems, and detention basins constructed indicating size, grade, and all manhole, inlets, headwalls, and culvert invert elevations referenced to U.S.G.S. datum or as may be required. All storm laterals where required shall be referenced to visible permanent physical features as to location, length, and depth as required by the administrative official(s) governing zoning, building, engineering, and public works regulations.

4.14.4 Water Distribution

The plan of all water mains showing exact locations of all fittings, valves, and fire hydrants. All service branches and water meters shall be shown, sizes indicated and referenced to visible permanent physical features as to location, length, and depth as required by the administrative official(s) governing zoning, building, engineering, and public works regulations.

SECTION 5. SUBDIVISION DESIGN STANDARDS

5.1 General

The provisions of Section 5.2 through Section 5.9 inclusive, shall control the way streets, public utilities, lots, and blocks and other physical elements of a subdivision are to be arranged on the land.

These subdivision design principles and standards shall help ensure convenient and safe streets, creation of usable lots, provision of adequately sized public utility systems and reservation of land for recreational purposes. The planning of attractive and functional neighborhoods shall be promoted, and the impact of subdivision developments will have on the provision of community facilities and the character of adjoining areas will be evaluated to ensure the continuation of an orderly and desirable residential community within the Village of Mt. Orab, Ohio.

5.2 Physical Features

Subdivisions shall be planned to take advantage of the topography of the land, to economize in the construction of drainage, street and sewer improvements to reduce the amount of grading, to preserve tree stands and topsoil, to protect such land features as water courses and unusual rock formations, which if safeguarded, will contribute to the value of the subdivision, the neighborhood, and the Village of Mt. Orab, Ohio.

Due consideration shall be given to the following conservation principles in preparing the design of a subdivision:

5.2.1 Flood Plain Protection

Lands susceptible to flooding within the boundaries of the subdivision shall not be platted for residential, or for any other uses that may cause increased danger to health, life, or property; or further aggravate the flood hazard. Such lands shall also meet FEMA regulations as applicable.

5.2.2 Erosion and Sedimentation Control

Extreme consideration shall be given to the sedimentation and erosion control guidelines established by the Village of Mt. Orab Water Management and Sediment Control (WMSC) Regulations (Appendix A), OEPA, or other such authorized agency, where earth moving practices involve the finished grading of improved lots, rehabilitation of excavated slopes, road grading, topsoil removal, alteration or enlargement of waterways or drainage creeks during and after construction.

5.2.3 Protection of Outstanding Natural Features

Outstanding natural features, irregularities in slope, natural drainage patterns of rivers, streams, and groves of trees shall be protected and avoided in designing the layout of streets, lots, and blocks.

5.2.4 Streets and Natural Land Features

Where the site is relatively flat, or includes very gentle undulations, the street pattern will be designed to follow the natural land and watercourses, if positive drainage is sufficiently met.

All building sites, wherever possible, shall be above the finished gradient of the street. On more irregular topography, streets shall be designed to avoid extreme cut and fill. Wherever possible, streets should follow the ridge lines or be designed to parallel the natural contours of the site to be subdivided.

5.3 Streets

Streets shall be designed as follows:

5.3.1 Street Design Principles

A. The arrangement alignment width, grade, construction, and location of all streets shall conform to the American Association of State Highway and Transportation Officials (AASHTO), and ODOT design standards.

B. Whenever a tract to be subdivided includes any part of a highway, primary or major arterial, or a collector street, the subdivider shall be required to plat the right-of-way in the existing location and at the minimum width per Village Typical Street Sections.

C. The design of proposed streets shall provide for the continuation of existing streets and provide access to adjacent unplatted lands so that the entire neighborhood will be served by a coordinated street system. The street pattern will also be designed to discourage through traffic within the boundaries of the subdivision.

D. Streets serving business and industrial subdivisions shall be planned to connect with primary or major arterials or collector streets so as not to generate heavy traffic volumes onto local streets.

5.3.2 Street Design Standards

The subdivider shall design and construct streets in accordance with the standards and specifications set forth in Section 5.3.11: Schedule of Required Street Design Standards.

5.3.3 Half Streets

Half streets shall be prohibited. However, whenever an existing dedicated and accepted half street abuts and parallels the boundary line of the tract to be subdivided; the Developer shall be responsible for platting the other half of the street.

5.3.4 Reserve Strips

Reserve strips controlling access into abutting properties shall be prohibited except where their control is placed with the Village under conditions approved by the Planning Commission.

5.3.5 Temporary Dead-End Streets

Except as otherwise provided herein, temporary dead-end streets may be recommended, provided that temporary paved turn-arounds shall be constructed where lots are fronting on such dead-end streets. The temporary turn-around shall meet the same standards as that required for the turn-around on a cul-de-sac street. At such time that the street is to be continued to the boundary of the tract, the extra right-of-way more than the street right-of-way shall be vacated and the reconditioning of said street and the front yards affected shall be at the expense of the subdivider.

5.3.6 Property Line Corner Radii

Property lines at street intersections shall be rounded with a radius of not less than 40 feet for collector streets and 30 feet for local streets.

5.3.7 Horizontal Alignments

A. Street jogs with centerline offsets of less than 125 feet shall be prohibited. The minimum radius of curvature for collector streets shall be 300 feet on the centerline and for local and cul-de-sac streets 200 feet on the centerline.

B. A tangent of at least 100 feet long shall be introduced between reverse curves.

5.3.8 Vertical Alignments

All changes in street grades with an algebraic difference greater than two percent shall be connected by vertical curves of a minimum length per ODOT Location & Design Manual.

5.3.9 Street Intersections

A. Streets shall be laid out to intersect as nearly as possible at right angles, and no street shall intersect any other street at an angle of less than 75 degrees.

B. Three-way intersections or “T” type intersections shall be used for local streets wherever practical and when not in conflict with the applicable design principles and standards of this Section.

C. Approaches to street intersections shall be straight for a distance of at least 100 feet from the centerline of the intersecting street.

5.3.10 Street Names

Names of new streets shall not duplicate or be confused with the names of existing streets within the Village of Mt. Orab, Ohio.

5.3.11 Schedule of Required Street Design Standards

STREET TYPE	STREET STANDARD
Arterial Street	
See ODOT Design Standards	
Collector Street	
Right-of-way width	80’
Pavement width	36’*
Maximum grade	8%
Minimum grade	0.5%
Local Street	
Right-of-way width	50’
Pavement width	24’* per sections
Maximum grade	10%
Minimum grade	0.5%
Cul-de-sac Streets	
Right-of-way width	50’
Pavement width	24’*
Maximum grade	10%
Minimum grade	0.5%
Maximum length of street	900’
Right-of-way diameter at closed end of cul-de-sac	102’ (residential only)
Outside pavement diameter at closed end of cul-de-sac	80’ (residential only)
Commercial Streets	
Right-of-way width	60’
Pavement width	36’
Maximum grade	6%
Minimum grade	0.5%
Maximum length of street	900’
Industrial Streets	
Right-of-way width	106’
Pavement width	36’
Maximum grade	6%
Minimum grade	0.5%
Maximum length of street	900’

*measured from back to back of curb or from edge to edge of pavement on Rural streets (with roadside swale).

5.4 Easements

Easements shall be as follows:

5.4.1 Utility Easements

If utilities are required along rear and side lot lines for underground utilities including water, storm, sanitary, sewer, telephone, and electric, the easement shall be centered on rear and side lot lines and shall have a minimum width of 20 feet.

5.4.2 Drainage Way Easements

Where a subdivision is traversed by a drainage way, a storm sewer easement or drainage right-of-way, an easement conforming substantially with the lines of such drainage way shall be provided. The easement shall be no less than 20 feet wide or of such further width and such easement shall generally follow rear and side lot lines.

5.4.3 Other Easements

Extra wide easements for black slopes, preservation areas, views, or riparian corridor protection may be required.

5.5 Blocks

Blocks shall be as follows:

5.5.1 Block Lengths

Blocks shall not exceed 1,800 feet in length or be less than 1,200 feet in length. However, these requirements may be re-examined in those cases where blocks have been shaped by cul-de-sacs and loop streets, or contain interior parks, playgrounds, or open space areas, providing the overall shape of the block continues to provide for convenient access, circulation, control, and safety of street traffic.

5.5.2 Pedestrian Ways

Pedestrian ways shall be required across blocks pedestrian access to schools, playgrounds, shopping center, and other community facilities is necessary.

5.6 Lots

Lots shall be as follows:

5.6.1 Lot Arrangement

The arrangement and design of lots shall be such that all lots will provide sufficiently sized building envelopes, properly related to topographic features, utilities, easements with building restrictions, and the character of the surrounding development.

5.6.2 Zoning Conformance

The lot size, width, depth, and the minimum building setback lines shall conform to the existing zoning regulations of the Village of Mt. Orab, Ohio.

5.6.3 Corner Lots

Corner lots shall have the minimum lot frontage required by the applicable zone on both streets. Corner lots shall have extra width to accommodate the required front yard setbacks from both streets.

5.6.4 Access to Public Streets

The subdivision of land shall provide each lot with access to an existing public street. Ingress/egress by easement is acceptable. No more than two flag lots may share a private access driveway.

5.6.5 Double Frontage Lots

Double frontage lots shall be prohibited.

5.6.6 Angle of Side Lot Lines

Side lot lines shall be at right angles to street lines or radial to curved street lines, except where the Zoning Administrator and/or Village Engineer determines that a variation to this rule would provide a better lot layout.

5.7 Entrance Gates and Signs

Entrance gates, posts, columns, wall, fences, or similar structures designed to indicate entrances to subdivisions or parts thereof, and signs designating the subdivision or development, will be permissible either on public property within an easement or on private property, provided that Village Staff determines such structures to be desirable, they do not impede the right-of-way, and the structures meet all applicable requirements of the Mt. Orab Zoning Code.

5.8 Sanitary Sewer and Water Systems

The subdivider shall design and install public sewer and water improvements of such size, shape, type, and capacity as required by the Village of Mt. Orab to adequately serve the use and density of current and future proposed development contemplated within the boundaries of the subdivision.

5.9 Stormwater Management System

5.9.1 Drainage Facilities

A drainage system shall be designed and installed by the subdivider as required for the area in which the proposed subdivision is located for the proper drainage of the surface water runoff from each lot within the subdivision. Where a subdivision is traversed by a drainage way or creek such water way may remain open or may be piped-in to allow flow through the site to continue.

5.9.2 Accessibility to an Existing Storm Sewer System

Where an existing public storm sewer system is reasonably accessible to the subdivision, has sufficient capacity, and doesn't change the overall flow rate, as determined by the Village Engineer, the subdivider shall connect the storm sewer system serving the subdivision with such stormwater drainage system.

5.9.3 Storm Water Management Policy

In determining whether proper drainage is being designed and installed, the Village shall be guided by the substantive standards and criteria for the design, construction, operation, maintenance, and use of stormwater drainage systems in the Village of Mt. Orab.

The Village of Mt. Orab, through its Planning Commission, retains all authority to administer and enforce these regulations.

SECTION 6. PRELIMINARY PLAT REQUIREMENTS

6.1 Preliminary Plat

A Preliminary Plat shall be submitted to the administrative official(s) governing zoning, building, engineering, and public works regulations, prior to the start of any grading or construction work upon the proposed streets and before any plat of said subdivisions is made in a form suitable for recording.

Where the Preliminary Plat covers only a part of the subdivider's entire contiguous holdings, a drawing of the prospective future street system of the unsubmitted part shall be furnished and the street system of the submitted part will be considered in the light of adjustments and connection with the street system of the part not submitted. The subdivider shall furnish the following:

6.1.1 Preliminary Plat Application

A Preliminary Plat application, submission fee, and associated documentation shall be submitted.

6.1.2 Vicinity Sketch

A vicinity sketch at a scale of one-inch equals 400 feet or more shall be drawn on or accompany the Preliminary Plat. Such vicinity sketch shall show all abutting existing subdivisions, streets, and unplatted parcels of land, together with the names of record owners of such parcels immediately adjoining the proposed subdivision and between it and the nearest existing highways or thoroughfares, streets, and alleys in the neighboring subdivisions or unplatted property. It shall also show the applicable section, range, and township; any corporation or ad hoc district lines, such as school or sewer districts, etc., all for producing the most advantageous development of the entire neighborhood.

6.1.3 Preliminary Plat Drawing

The Preliminary Plat shall be prepared by a professional engineer or surveyor. The plat shall be accurately and clearly drawn at a scale of one-inch equals 100 feet or less. The Preliminary Plat shall be drawn on mylar or equivalent on one or more sheets no larger than 24" x 36" in size.

6.2 Existing Data and Information

The Preliminary Plat shall clearly show the following existing features and information:

6.2.1 Name of Subdivision

The proposed name of the subdivision which shall not duplicate or closely approximate the name of any other subdivision in Mt. Orab, Ohio.

6.2.2 Designation

The tract designation according to real estate records of the recorder of the county where located.

6.2.3 Owners of Record

The names, addresses, and phone numbers, of the owner(s) of record, the Developer and the engineer or surveyor preparing the Preliminary Plat. The recording references for the deed(s) of conveyance to the owner or owners shall also be depicted.

6.2.4 Abutting Owners

The name of adjacent subdivisions and the names of record owners or adjacent parcels of unplatted land. The recording references for the deed(s) of conveyance to the owner or owners shall also be depicted.

6.2.5 Boundary Lines

The boundary lines, accurate in scale, showing bearings and distances and the method they were derived from, as surveyed by a registered surveyor, or as shown by existing deed records of the tract to be subdivided. If applicable, all corporation lines, section lines, and township lines shall be shown.

6.2.6 Streets and Other Public Ways

The names and location of all existing or platted streets or other public ways, such as bridges, railroad lines, etc. within or adjacent to the subdivision. The width of all rights-of-way and roadways shall be identified.

6.2.7 Easements

Identify the location, width and purpose of any easement within or immediately adjacent to the proposed subdivision.

6.2.8 Existing Utilities

Existing sewers, water mains, pipe lines, pole lines, high tension lines, culverts, and other underground structures within the tract and immediately adjacent thereto with pipe sizes, type, and grades indicated, and the location and depth of all existing underground utilities.

6.2.9 Topography

Show contours with intervals of not more than five feet if ground slope is more than 10 percent and two feet if ground slope is less than 10 percent, as referenced to U.S.G.S. datum, or as may be required by City Staff.

6.2.10 Natural and Site Features

The location of all significant physical features of the site including water courses, lakes, rivers, areas subject to flooding, wetlands, excessively steep slopes, stands of trees, trees eight inches in caliper or greater, rock outcropping and any structure or other significant features.

6.2.11 Zoning

Indicate zoning boundary lines of subdivision and adjacent property.

6.2.12 Title Block

Indicate the north point, scale, title, and date.

6.3 Proposed Features and Information

The Preliminary Plat shall clearly show the following proposed features and information.

6.3.1 Streets

The layout of proposed streets, with the right-of-way and pavement designs meeting the requirements of the Subdivision Regulations. Proposed street names shall be indicated and shall not duplicate or closely approximate any existing street names in Mt. Orab, Ohio except extensions of existing streets.

6.3.2 Easements

Identify the location, width, and purpose of all public and private easements (i.e., sanitary, water, storm sewers, drainage, detention/retention, access, preservation areas, etc.)

6.3.3 Lots

The layout, consecutively numbered, scaled dimensions, estimated areas of irregular-shaped lots in square feet and front yard setback lines of proposed lots.

6.3.4 Land for Public Use

All parcels of land intended to be dedicated or temporarily reserved for public use, or all parcels of land of which the ownership remains private which are reserved in the deeds for the common use of property owners in the subdivision, with the purpose, condition, or limitation of such reservation indicated shall be indicated on the Preliminary Plat. If such land is to be private, a statement of proposed covenants or restrictions for future maintenance shall be furnished, whether on the plat or as a separate recorded instrument.

6.3.5 Development Analysis

Provide the total acreage, number of lots, typical lot size required by zoning, acreage of open space if provide, etc.

6.3.6 Utilities

Identify all sanitary sewers, water lines, and storm water management facilities.

6.3.7 Deed Restrictions

Copies of any private restrictions to be included in the deeds shall be depicted upon, or attached by reference to, the Preliminary Plat.

6.3.8 Buried Debris

The location and dimensions of any burial sites of organic debris which results from clearing and construction of the proposed subdivision. Organic debris includes tree stumps and other organic matter which naturally decomposes. This provision shall not be interpreted to authorize burial or landfilling of inorganic debris, including but not limited to, construction debris or other solid wastes, which shall only be disposed of according to the regulations of the Ohio Environmental Protection Agency, or such other authorized agency.

6.3.9 Stormwater Management System

A stormwater management plan indicating the development's ability to comply with the Stormwater Drainage Policy as identified in Section 5.9: Stormwater Management System of these regulations.

6.3.10 Title Block

Indicate the North point, scale, date, and title.

SECTION 7. IMPROVEMENT PLAN REQUIREMENTS

7.1 Improvement Plan Review Procedure

7.1.1 The applicant is encouraged to have a pre-application meeting with the Planning Commission's Staff.

7.1.2 After meeting informally with the Planning Commission's Staff, the subdivider or applicant shall, prior to the construction and installation of any utilities or roads or grading of any parcel, prepare and submit an Improvement Plan for review and action by the Mt. Orab Planning Commission's staff.

7.1.3 In general, the Improvement Plan shall be consistent with the approved Preliminary Plat.

7.1.4 The property owner, developer, or applicant may file an application and submit an Improvement Plan to the Planning Commission's staff at any time during normal business hours.

7.1.5 The staff will review each plan and have forty-five (45) calendar days from date of receipt to take action on a submitted Improvement Plan unless the time limitation is waived by agreement between the developer and Planning Commission.

7.1.6 If the Commission's staff approves the plan then the applicant may proceed with construction.

7.1.7 The applicant shall submit one (1) full scale paper set and one pdf file of the Improvement Plan of the proposed subdivision to the Planning Commission's Staff.

7.1.8 Copies of the submitted Improvement Plan may then be forwarded by the Planning Commission's Staff to the appropriate public/private utility companies, legislative bodies, state or county highway/road department, soil conservation service or other pertinent body in order to seek input and coordinate reviews.

7.1.9 Action or comments received from the above organizations is not required for Planning Commission approval.

7.2 Improvement Plan Requirements

The Improvement Plan shall provide the minimum acceptable design and improvement standards which are required as a precondition to development or in conjunction with development for lots, streets, utilities, and other physical elements in the subdivision.

The Improvement Plan shall provide the minimum acceptable design and improvement standards which are required as a precondition to development or in conjunction with development for lots, streets, utilities, and other physical elements in the subdivision.

Based upon the information and design plans of the subdivision, the Planning Commission may request additional information on any of the following requirements in order to clarify design issues.

The Improvement Plan shall be designed by an Ohio Licensed Professional Engineer and installed in accord with these and other applicable regulations, and shall contain the following information:

7.2.1 The proposed name of the subdivision or development.

In no case shall the name of a proposed subdivision be duplicated or be similar to an existing subdivision in the Village of Mt. Orab unless it is an extension or an expansion of existing subdivision.

7.2.2 Names and addresses of owner or developer of the subdivision and the Ohio Licensed Professional Engineer responsible for the design of all improvements.

A. The plan shall be certified with the seal of the engineer.

7.2.3 Vicinity map.

A vicinity map showing the proposed location of the subdivision in relation to roads in the area, and the boundaries of the phase or phases under review relative to the entire subdivision.

A. The vicinity map shall have an approximate scale

7.2.4 Scale.

The plan shall be to a scale of one (1) inch is equal to fifty (50) feet and the submitted drawing shall be a 24" X 36" sheet size unless another scale is approved by Staff.

A. On large lots, this scale may be used to show just the graded portion of the lots and improvements.

B. A graphic or a written scale shall be on each sheet of the plan.

7.2.5 Date and North Arrow.

The date shall be on the cover or first sheet of the plan, and a north arrow shall be on all sheets of the plan that contain a two-dimensional map.

7.2.6 Boundary.

The boundary of the subdivision or section of subdivision under review shall be indicated by a heavy, solid line on one sheet of the plan at a standard scale to show the location of section under review with other sections of the subdivision.

A. All subdivision boundary lines shall be labeled with the bearing and distance.

7.2.7 Features.

Location, right-of-way width, and name of all existing and recorded streets, railroads, public and private utility rights-of-way or easements (including drainage easements); water courses (creeks, rivers, swales, drainage swales, etc.); public parks and open spaces; buildings (labeled as "to remain" or "to be removed"); corporation, county and state lines; cemeteries and other historical landmarks or features.

A. Drainage easements not planned to be piped shall also be considered drainage easements and thus labeled "drainage easements".

7.2.8 Utility facilities and sidewalks.

Location and sizes of all existing utility facilities (public and private) within or adjacent to the subdivision or development area. Location and width of all public or private sidewalks, including ownership and maintenance of private sidewalks and pathway systems.

7.2.9 Zoning districts.

Location and identification of all existing zoning districts within or adjoining the subdivision or project area.

A. If used for residential purposes, the type of housing shall be stated on the Improvement Plan.

7.2.10 Contours.

Existing contours with intervals of not more than two (2) feet shall be clearly marked with elevation based on mean sea level (U.S.G.S. Datum) and location and description of the benchmark used.

A. Plans shall show all intended grading and drainage design and language such as "sloped to drain" is discouraged unless there is a clearly defined and engineered project limits."

7.2.11 Location, right-of-way and pavement width, and name of all proposed streets and other public utility rights-of-way or easements.

A. Show striping of street lanes on roads with more than two lanes.

B. Show location of streetlights and submit detail of a typical light fixture.

C. A typical detail drawing, which depicts the classification of the proposed street shall be shown on the Improvement Plan.

D. Where divided entrances are proposed, detail plans shall be submitted for review and approval. Caution shall be taken not to install landscaping or other items within the island of a divided entrance that impedes the site triangle of the intersection.

E. Note signage located at the temporary dead end of streets that are planned to continue through a development and connect with an adjoining property or another roadway to inform the public of a future street connection.

F. Proposed street names shall not duplicate or closely approximate phonetically the name of any other street in the Village of Mt. Orab.

G. Street stations and PVI's shall be labeled on the centerline of proposed streets and correspond to profiles of said street.

7.2.12 Lots.

Proposed location and identification number of all lots with the distances of all proposed lot lines noted and the areas in terms of square feet.

A. The proposed drainage of individual lots will be indicated by arrows showing the water flow off the lot.

7.2.13 Street profiles.

Profile of each proposed street with finish grades (including adequate extensions, where necessary, beyond the proposed subdivision or development or section) including all existing and proposed underground public utility crossings with catch basins, junction boxes, and manholes and existing private utility crossings including gas, electricity, and telephone.

A. Horizontal scale shall be same as the plan scale, and vertical scale not less than one inch (1") equal to ten feet (10') unless approved by the Village of Mt. Orab Planning Commission Staff.

B. Stationing shall be labeled and correspond to the plan view.

7.2.14 Utilities.

Location of proposed sanitary, storm water, and water resource systems, including all facilities relating thereto such as manholes, pump stations, sewerage plants, catch basins, junction boxes, headwalls, water valves, fire hydrants.

A. Detention/retention areas or ponds shall be clearly identified with the 100-year storm elevation labeled.

B. Detailed drawings of all overflow facilities shall be shown.

C. All storm water and sanitary sewer facilities (catch basins, junction boxes, headwalls, manholes) shall be numbered and correspond to those facilities on profiles as described in item 7.2.18 of this section.

D. Connection to existing facilities shall be shown and labeled. Responsibility of maintenance of any detention/retention areas shall be noted on the Improvement Plan.

7.2.15 Show boundaries of Buffer Zones along designated creeks.

7.2.16 Drainage.

Location and identification of any drainage facility (i.e. man-made dams) or natural feature (i.e. lake or pond) on the site or within one hundred feet (100') of the subdivision or development boundary which has or could have a significant impact on drainage or siltation control.

7.2.17 Storm and Sanitary Profiles.

Profiles of all proposed storm water and sanitary sewer pipelines, and facilities including percent grade, pipe diameters, material of pipe, pipe lengths, and invert elevations.

A. Profiles shall also show all existing and proposed public utility (water, storm and sanitary sewer) crossings, and all existing private utility (gas, electric, telephone) crossings.

B. The facilities (catch basins, junction boxes, headwalls, manholes) shall be numbered and correspond to those facilities as described in item 7.2.15 of this section.

C. The 25-year hydraulic grade lines shall be shown for all storm water systems.

D. Detail drawings of all detention/retention overflow and controlling facilities including valves shall be shown.

E. Connections to existing pipelines or facilities shall be shown and labeled.

7.2.18 Design Calculations.

Design calculations for all drainage facilities including detention/ retention basins, sediment basins, storm water pipelines and drainage channels.

A. Calculations must include flows, 25-year hydraulic grade elevations, mean velocities, etc., and be approved and signed by a Ohio licensed Professional Engineer.

7.2.19 Proposed Contours.

Proposed finished contours with intervals of not more than two (2) feet, shall be clearly labeled and be related to the existing contours.

A. Maximum grade for any excavated (cut or fill) slopes shall be 3:1 (3 feet horizontal for each 1 foot vertical), and the design slope shall be labeled on the plan.

B. Engineered slopes may be steeper upon report by a geotechnical engineer approved by the Planning Commission.

C. For all residential subdivisions, the top of foundation at the first floor elevation and drainage arrows indicating the final drainage pattern of the proposed lots shall be provided.

D. Disturbed limits shall be clearly identified on the submitted plan and in the field.

7.2.20 Adjacent subdivisions and streets.

The names of adjacent subdivisions and all street rights-of-way within two hundred (200) feet of the subdivision boundary and the names of the property owners of all adjoining unsubdivided properties.

A. If the proposed subdivision is an additional section of an existing subdivision, the plan shall show the numbering of all adjoining sections and lots.

7.2.21 Reference to the type of street and a typical cross-section detail as noted in the current Village Street Specifications.

7.2.22 Setbacks.

The minimum building setback lines as stated in the current Village of Mt. Orab Zoning Regulations shall be shown on each lot.

7.2.23 Lots not designated for housing.

Label lots in the proposed subdivision or development that are intended to be dedicated or temporarily reserved for public use, or to be reserved by deed covenant for use of all property owners in the subdivision, and the conditions (if any) of such dedication or reservation.

A. The applicant shall provide information regarding any dedication of public lands, restrictive covenants on non-development areas, or conservation easements.

7.2.24 Landscaping.

Identify all landscaped areas within a proposed public street right-of-way along with an easement and maintenance responsibility of such features.

A. If landscaped islands are proposed, drainage facilities are required, and a detail of the island shown and labeled.

B. Any fencing required or landscape treatment required of these regulations shall be shown with explanatory notes or details provided.

C. Any Street Trees required for new dwellings subject to the Zoning Permit procedure shall be shown or noted.

7.2.25 Erosion and sediment control.

Location of all erosion and sediment control facilities shall be shown on the plan, with detail drawings of each type of facility being used.

A. The detailed soil erosion techniques or features may be referenced on the plan in accordance with the Street, Storm, and Sidewalk Specifications and submitted Best Management Practice document.

7.2.26 Homeowners Association.

A. A statement regarding the intent to create a Homeowners Association and intended maintenance for HOA owned or controlled improvements.

SECTION 8. RECORD PLAT REQUIREMENTS

8.1 Record Plat

No subdivision, as defined in Section 5: Subdivision Design Standards, shall be made of land within the jurisdiction of the Planning Commission without the preparation of a Record Plat in accordance with the provisions of these regulations except as exempted from such platting by Section 9: Modifications and Minor Subdivisions.

The Record Plat shall not be approved by the Planning Commission prior to the completion or assurance of completion of all public improvements in accordance with the Subdivision Regulations.

8.2 Record Plat Submission

A Record Plat application, submission fee, and associated documentation, shall be submitted to the administrative official(s) governing zoning, building, engineering, and public works regulations. The Record Plat shall be drawn at the scale of one-inch equals 100 feet or less and shall clearly show the following features and information as identified below.

8.3 Required Information

The Record Plat shall clearly show the following information:

8.3.1 Boundary Lines

All plat boundary lines with lengths of courses to hundredths of a foot and bearings to half minutes. These boundaries shall be determined by an accurate survey in the field, which shall be balanced and closed with an error of closure or not to exceed one to 10,000.

8.3.2 Recorded Streets

The exact locations and the widths along the property lines of all existing or recorded streets intersecting or paralleling the boundaries of the tract.

8.3.3 Bearings – Distances

True bearings and distances to nearest established street bounds, patent corners or other established survey lines, or other official monuments, which monuments shall be located or accurately described on the plat. Any patent or other established survey or corporation lines shall be accurately monument-marked and located on the plat, and their names shall be lettered on them.

8.3.4 Monuments

The accurate location and material of all permanent reference monuments.

8.3.5 Layout

The exact layout including:

8.3.5.1 **Street and Alley Lines.** Identifying their names, bearings, length (along center lines), angles of intersection and widths (including widths along the line of any obliquely- intersecting street).

8.3.5.2 **Lengths of all Arcs.** Identifying all radii, points of curvature and tangent bearings.

8.3.5.3 **Easements.** Identifying all easements, whether public or private, and rights-of-way, when provided for or owned by public services (with limitation of the easement rights stated on the plat).

8.3.5.4 **Lot Lines.** All lot lines with dimensions in feet and hundredths, and with bearings and angles to minutes if other than right angles to the street and alley lines.

8.3.6 Lots and Block Numbers

Lots numbered in numerical order, and blocks lettered in alphabetical order. In case there is a re-subdivision of lots in any block, such re-subdivided lots shall be designed by their original number prefixed with the term most accurately describing such division, such as: W ½ of 3, N40' of 5, etc., or they shall be designated numerically beginning with the number following the highest lot number in the block.

8.3.7 Property Deeded to the City

In the event there is property to be deeded to the City for a public purpose that is party of the subdivision, the deed(s) shall be given to the City at the time of approval of the Record Plat.

8.3.8 Property Offered for Dedication

The accurate outline of all property which is offered for dedication for public use, and of all property that may be reserved by covenant in the deeds for the common use of the property owners in the subdivision, with the purpose indicated thereon. Hillside and riparian corridors should be dedicated as privately owned greenspace.

8.3.9 Water Courses

In case the subdivision is traversed by a stream or creek, the location of such channel, stream, or creek.

8.3.10 Setback Lines

Setback building lines are established by the Zoning Code, and any other setback lines or street lines established by public authority and those stipulated in the deed restrictions, shall be shown graphically with dimensions.

8.3.11 Deed Restrictions

Private restrictions if any, including boundaries or each type of use restriction; and other private restrictions for each restricted section of the subdivision.

8.3.12 Name of Subdivision

Name of the subdivision and name or number of the largest subdivision or tract of which the tract now subdivided forms a part.

8.3.13 Adjoining Subdivision

Names and locations of adjoining subdivisions and location and ownership of adjoining unplatted property.

8.3.14 Names of Owners, etc.

Names and addresses of the owners of record, the Developer, and of the registered professional engineer or registered surveyor who prepared the Record Plat.

8.3.15 Title Block

Identifying the North point, scale, title, and date.

8.3.16 Transfer Statement

Statement that any lot transferred will have a minimum width and area substantially the same as those shown on the plat, and that only one principal building will be permitted on any such lot.

8.3.17 Engineer's Certificate

Certificate by a qualified registered professional engineer or surveyor to the effect that he has fully complied with the requirements of these regulations and the subdivision laws of the State of Ohio governing surveying, dividing and mapping of the land; that the plat is a correct representation of all the exterior boundaries of the land surveyed and the subdivision of it; that the plat represents a survey made by him and that all monuments indicated thereon actually exist and their location, size, and materials are correctly shown.

8.3.18 Additional Requirements

Any additional statements, certifications, affidavits, or information required by the administrative official(s) governing zoning, building, engineering, and public works regulations or the Planning Commission or County of recordation shall be provided by the Developer.

SECTION 9. MODIFICATIONS AND MINOR SUBDIVISIONS

9.1 Modification or Subdivision Design Standards – Self Contained Neighborhoods

The Subdivision Design Standards, stipulated in Section 5 of these Subdivision Regulations, may be modified by the Planning Commission in the case of a Special Planning District Development, and in the case of a subdivision large enough to constitute a more or less self- contained neighborhood, which is to be developed in accordance with a Comprehensive Plan, safeguarded by appropriate restrictions, which in the judgement of the Planning Commission made adequate provision for all essential community requirements; provided, however, that no modification shall be granted by the Planning Commission which would conflict with the intent and purpose of the Subdivision Design Requirements contained herein.

9.2 Modification

Where it can be shown in the case of a particular proposed subdivision that strict compliance with the requirements of these regulations would result in extraordinary or undue hardship to the applicant or Developer, or that these conditions would result in delaying the achievement of the objectives of these regulations, the Planning Commission may waive, vary, or modify the requirements so that the subdivision is in conformance with all applicable regulations and standards and the public interest is secured. Any such determination shall be based fundamentally on a find that:

A. The granting of the variance, exception, or waiver of conditions will not be detrimental to the public safety, health, or welfare or is injurious to other property.

B. The conditions upon which the request is based are unique to the property for which the relief is sought and are not applicable generally to other property.

C. Because of the particular physical surroundings, shape, or topographical conditions of the specific property involved, a particular hardship to the owner would result, as distinguished from a mere inconvenience, if the strict letter of these regulations is carried out.

D. The relief sought will not, in any manner, vary the provisions of the Zoning Code, Comprehensive Plan, or Official Zoning Map, except that those documents may be amended in the manner prescribed by law.

In no case shall any variance, modification, or waiver be more than a minimum easing of the requirements, and in no case shall it conflict with the existing zoning regulations of the Village of Mt. Orab, Ohio.

In granting variances, modifications, or waivers; the Planning Commission may require such conditions as will in its judgement, to secure substantially the objectives of these regulations so affected.

The Developer shall apply for a variance, modification, or waiver in writing to the administrative official(s) governing zoning, building, engineering, and public works regulations simultaneously with the Preliminary Plat. The application shall explain in detail the reasons for and any facts supporting the request. Any modifications granted shall be entered, in writing, into the minutes of the Planning Commission meeting.

9.3 Minor Subdivisions and Lot Splits

9.3.1 Minor Subdivision and Lot Split Exemptions

In the case of a subdivision consisting of five lots or less or in the case of a lot split, the administrative official(s) governing zoning, building, engineering, and public works regulations may exempt the Developer from complying with some of the requirements stipulated in Section 6: Preliminary Plat Requirements pertaining to the preparation of the Preliminary Plat, provided however that ALL of the following conditions are met:

A. The proposed subdivision is located along an existing dedicated public street or road and involves no opening, widening, or extension of any street or road. Each lot or parcel created must display adequate frontage on an existing dedicated public road.

B. No more than five lots or parcels, any one of which is less than five acres, are created.

C. The proposed subdivision is not contrary to applicable subdivision or zoning regulations. Approval may not be granted if any variance from either zoning or subdivision regulations are requested.

D. The property has been surveyed and the Record Plat drawings conform with the requirement of Record Plats.

9.3.2 Minor Subdivision and Lot Split Approval Process

A minor subdivision or lot split, meeting all the requirements within these regulations, may be submitted to the administrative official(s) governing zoning, building, engineering, and public works regulations for approval. The administrative official(s) governing zoning, building, engineering, and public works regulations shall review the application and determine if it satisfies all applicable platting, subdividing, and zoning regulations. If all regulations are satisfied the administrative official(s) governing zoning, building, engineering, and public works regulations shall approval such proposed division and instruct the Developer that the plat is to be submitted to the county in which it is located for recording.

If the administrative official(s) governing zoning, building, engineering, and public works regulations denies a recommendation for approval of a minor subdivision or lot split, such decision can be appealed to the Planning Commission. Additionally, if the administrative official(s) governing zoning, building, engineering, and public works regulations is in doubt as to whether or not such subdivision qualifies as a minor subdivision or lot split, such application can be referred to the Planning Commission for approval.

APPENDIX A

Village of Mt Orab

Water Management and Sediment Control (WMSC)

Regulations

Acknowledgements and Intent:

The Village of Mount Orab would like to thank the Clermont County Building Inspection Department (CCBID), Clermont County Engineer, Clermont County Water Resources Department, Clermont County Board of Commissioners, and the City of Milford, Ohio for allowing the Village of Mt Orab utilization of the Clermont and Milford Fire Department Regulations and Standards.

The intent of these regulations is to provide the developers, construction professionals, building professionals, citizens, and all other users with similar regulations for the region. Many differences are historical.

Notice: Some Mount Orab regulations are unique to the Village. Sections of the regulations that differ from Clermont County Regulations are clearly marked.

CLERMONT COUNTY

WATER MANAGEMENT
AND
SEDIMENT CONTROL
(WMSC)

REGULATIONS

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Table of Contents *(Continued)*

ARTICLE 1.0 WMSC GENERAL PROVISIONS

SECTION 100 TITLE

These regulations shall be known and may be cited as the Clermont County Water Management and Sediment Control Regulations and are hereinafter referred to as WMSC Regulations.

SECTION 110 STATUTORY AUTHORIZATION

These WMSC Regulations of Clermont County are promulgated pursuant to Section 307.79 of the Ohio Revised Code, whereby a Board of County Commissioners may adopt rules to abate soil erosion and water pollution from soil sediment.

SECTION 120 ADMINISTRATION

These WMSC Regulations of Clermont County shall be administered by the Clermont County Building Inspection Department (CCBID). The Building Official of the CCBID shall be the administrator and shall enforce these regulations and issue such notices and orders as may be necessary.

SECTION 130 MEANS OF APPEAL

Applicants for WMSC permits aggrieved by or property owners who allege damages resulting directly from any decision, interpretation or literal enforcement by the CCBID made under the provision of these regulations may appeal the matter to the Clermont County Board of Appeals, which shall be referred to as The Board for the purposes of this section.

130.1 Board of Appeals

130.1-1 **Composition:** The Board shall consist of five (5) members as follows:

A. One Engineer, Registered in the State of Ohio.
B. One Surveyor, Registered in the State of Ohio.
C. One Developer/Real Estate Professional.
D. Two members shall come from the professional community, preferably with knowledge in the construction field or an Attorney admitted to the Ohio Bar.

130.1-2 **Terms:** Members shall be appointed by the Clermont County Board of Commissioners and:

A. Shall serve three (3) year terms.

B. Shall hold office from the date of appointment until the end of the appointed term. However, he/she shall remain on the board until a successor takes his/her place or thirty (30) days, whichever occurs first.

C. Any member appointed to fill a vacancy occurring before the expiration of a term shall hold office for the remainder of that term.

D. A minimum of three (3) members must be present to constitute a legal meeting.

E. In the event a conflict of interest arises, as determined by the Clermont County Board of Commissioners, an alternate member (as described in Section 130.1-1 A-D) with the same qualifications shall be appointed by the Clermont County Board of Commissioners.

130.1-3 **Purpose**

A. The purpose of the Appeals Board is to allow an appeal by applicants for WMSC permits aggrieved by or property owners who allege damages resulting directly from a decision of the CCBID or by a requirement or regulation that cannot be met in a specific circumstance.

B. If the decision of the Appeals Board is to rule in favor of the requested relief, the person(s) or entity shall be granted a variance. A variance from these regulations can only be granted when the application demonstrates the following:

(1) The variance request is consistent with the general purpose and intent of these regulations and will not cause damage to other properties or the surrounding environment or endanger the public health, safety or welfare.
(2) The variance request indicates special or unusual conditions that exist on the development site or project area.
(3) Strict application of these regulations would cause undo hardship for the applicant or deprive the applicant of reasonable use of the development site.

130.2 Hearing and Conduct, Board of Appeals

130.2-1 The Board of Appeals shall set a date for a public hearing upon receiving the appeal request form the applicant and shall arrive at a decision no more than fifteen (15) working days after the hearing. The Board of Appeals shall notify the local jurisdiction where the appeal is located.

130.2-2 The Board of Appeals shall keep a full and complete record of all proceedings, which shall be open to public inspection. The proceedings will be recorded in a form that can be transcribed and all parties testifying will be placed under oath.

130.2-3 Appeals from the decision made by the Board of Appeals may be taken, to the Clermont County Court of Common Pleas.

130.3 Application for Variance, Board of Appeals

A variance is sought when a disagreement with these regulations occurs and a person or group of people applies to the Board of Appeals to eliminate their compliance with these regulations in regard to the specific disagreement. Applications for variances shall:

130.3-1 State fully the specific variance requested, the grounds for the variance, and the facts as they are presented by the person(s) requesting the variance.

130.3-2 Be signed by the owner or his agent.

130.3-3 Complete the Application for Variance Form.

130.4 Conditions for Issuing a Variance, Board of Appeals

130.4-1 The variance does not become effective until approval has been granted and the final design plan fulfills the requirements of these regulations not affected by the variance.

130.4-2 The granting of a variance shall not relieve the applicant of the responsibility to comply with all applicable orders, rules, and conditions of a site development permit or a building permit.

SECTION 140 PURPOSE AND INTERPRETATION

The Board of Clermont County Commissioners adopts these regulations to establish management and conservation practices which will eliminate or abate soil erosion and degradation of the waters of the State from sediment caused by non-farm earth disturbing activities. These regulations further intend, but are not limited, to accomplish the following:

140.1 Eliminate or minimize downstream flooding, erosion, and sedimentation damages caused by development and other earth disturbing activities.

140.2 Eliminate or reduce damage to watercourses which may be caused by increases in the volume of the runoff entering the streams or by the sediment and pollutants contained in the storm water runoff.

140.3 Establish a basis for the design of storm water management systems in order to protect the current and future rights and options of both the dominant and sub-servient property owners and help assure the long-term adequacy of the storm water management systems that will be required.

140.4 Encourage innovative design which will enhance the control of erosion and sediment in a manner consistent with the intent of the regulations. Provide for innovative design of the controlled release of storm water from the site, in lieu of those requirements resulting from a strict interpretation of these regulations so long as the system meets the allowable discharge rates, or an equivalency is met.

SECTION 150 WMSC APPLICATIONS

These WMSC Regulations shall apply to all non-farm earth disturbing activities performed on the unincorporated lands of Clermont County, Ohio except those activities excluded in Ohio Revised Code Section 307.79.

Exceptions:

A. Strip mining operations regulated under Section 1513.01 of the Ohio Revised Code.
B. Surface mining operations regulated under Section 1514.01 of the Ohio Revised Code.
C. Public highways, transportation, and drainage improvements or maintenance thereof undertaken by a public entity (i.e., state, county, township, city or village) within the public right-of-way and/or construction easement associated with the project which are required to obtain coverage under Ohio EPA's Construction General Permit, shall provide a copy of the EPA's acknowledgement of coverage to the CCBID before the start of construction.

SECTION 160 COORDINATION WITH LOCAL, STATE AND FEDERAL REGULATIONS AND PERMITS

Approvals issued in accordance with these WMSC Regulations do not relieve the applicant of responsibility for obtaining all other necessary permits and/or approvals from federal, state and/or local governments, and compliance with other legal requirements. If requirements vary, the most restrictive shall prevail. Other permits and requirements may include, but are not limited to, the following:

D. The most recent Ohio EPA General Permit Authorization for Storm Water Discharges Associated with Construction Activity under the National Pollutant Discharge Elimination System (NPDES), also known as the Construction General Permit
E. The latest applicable Ohio EPA NPDES Permit authorizing storm water discharges associated with industrial activities
F. U.S. Army Corps of Engineers permits under Section 404 of the Clean Water Act
G. Ohio EPA Section 401 Water Quality Certification General Isolated Wetland Permit and/or non-jurisdictional wetland/stream program approvals
H. Ohio Dam Safety Law, Ohio Administrative Code Section 1501.21
I. Applicable flood plain regulations; and
J. Applicable ground water protection laws

SECTION 170 DISCLAIMER OF LIABILITY

Neither submission of a plan under the provision herein nor compliance with the provisions of these WMSC Regulations shall relieve any person(s) from responsibility for damage to any person(s) or property otherwise imposed by law; nor shall it create a duty by the Board of Clermont County Commissioners or the CCBID to those impacted by soil sediment pollution and storm water runoff.

SECTION 180 SEVERABILITY

If any clause, section, or provision of these WMSC regulations is declared invalid or unconstitutional by a court of competent jurisdiction, validity of the remainder shall not be affected thereby.

SECTION 190 EFFECTIVE DATE

190.1 The WMSC Regulations became effective on April 2, 1990.

190.2 Revised September 18, 1992

190.3 Revised July 30, 2007

190.4 Revised June 11, 2011

190.5 Revised December 30, 2017

190.6 These Revised WMSC Regulations become effective on August 7, 2022, the thirty-first (31st) day following the date of their adoption by the Board of Clermont County Commissioners.

SECTION 191 REFERENCES

A. Ohio Environmental Protection Agency, Rainwater and Land Development – Ohio's Standards for Storm Water Management, Land Development and Urban Stream Protection, Latest Edition.
B. Ohio Department of Transportation, Location and Design Manual – Volume 2, Drainage Design, Latest Edition
C. Ohio Environmental Protection Agency, Storm Water Discharges from Small and Large Construction Activities – General Permit, effective date April 23, 2018.
D. Natural Resources Conservation Service, U.S. Dept. of Agriculture, Urban Hydrology for Small Watersheds (Technical Release No. 55), June 1986.

SECTION 192 AMENDMENTS

Whenever the public necessity, convenience, general welfare, or good water management practice requires, the Board of Clermont County Commissioners may amend, change, or supplement these regulations in the procedure as specified in Section 307.79 of the Ohio Revised Code.

ARTICLE 2.0 WMSC DEFINITIONS

SECTION 200 INTERPRETATION OF WORDS AND TERMS

For the purpose of these regulations, certain rules or word usage apply to the text as follows:

200.1 Words used in the present tense include the future tense, and the singular includes the plural, unless the context clearly indicates the contrary.

200.2 The term "shall" is always mandatory and not discretionary; the term "may" is permissive; the term "should" is permissive but indicates strong suggestion.

200.3 Any word or term not interpreted or defined by this article shall be construed according to the rules of grammar and common usage so as to give these regulations their most reasonable application.

SECTION 210 DEFINITIONS OF WORDS AND TERMS

Approved Subdivision or Development: Any development that has received design plan approval from the Clermont County Planning Commission.

Best Management Practices (BMPs): Include schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, structural facilities and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to receiving waters, or the Clermont County Separate Storm Sewer System. BMPs also include, but are not limited to, treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Buffer: A vegetated area, including trees, shrubs, and herbaceous vegetation, which exists or is established to protect a watercourse and its floodway or floodplain.

Channel: A natural or man-made depression in the earth utilized or designed to convey water.

CCBID: Clermont County Building Inspection Department.

Clearing: Any activity which removes the vegetative surface cover

Clermont County Separate Storm Sewer System (CCS4): The infrastructure installed and maintained by the County of Clermont, Ohio by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.

Concentrated Flow: Any storm water runoff which flows through a drainage pipe, ditch, diversion or other discrete conveyance channel.

Critical Area: An area susceptible to erosion and sediment production that requires special management to establish and maintain vegetation in order to stabilize the soil.

Cut: An excavation and/or the material removed in an excavation.

Detention Structure: A permanent structure used for the temporary storage of storm water runoff and designed so as to not create a permanent pool of water.

Develop: The act of preparing a site through clearing, grading, excavation, fill, storm and sanitary sewer installation, or other similar procedures for commercial, industrial, residential, or other non-farm purposes.

Development: The end result that occurs through clearing, grading, fill, excavation, storm sewer, sanitary sewer, and utility installation, building construction and other structures, or other similar procedures for commercial, industrial, residential, or other non-farm purposes.

Development Area: Any contiguous area owned by one person(s) or entity and defined by a metes and bounds description or operated as one development unit within that contiguous area and used or proposed to be used for commercial, industrial, residential, or other non-farm purposes upon which earth-disturbances will occur.

Denuded Areas: Those areas that are stripped or cleared of all vegetative cover thereby exposing the bare soil to erosion.

Discharge: The release, addition or deposit of any fluid, liquid, solid, flowing substance, or any other material or substance to the Clermont County Separate Storm Sewer System (CCS4).

Disturbance: Any clearing, grading, excavating, filling, or other alteration of land surface where natural or man-made cover is destroyed in a manner that exposes the underlying soils.

Ditch: An open channel that is either natural or man-made for the purpose of drainage of storm water runoff or irrigation.

Drainageway: Any natural or man-made storm water conveyance system; typically a swale**,** ditch or an open channel**.**

Earth Disturbing Activity: Any clearing, grading, excavation, fill or other alteration of the earth=s surface where natural or man-made ground cover is destroyed or altered and which may result in or contribute to erosion and sediment pollution.

Enforcing Official: The Chief Building Official of the CCBID or his designee, including all of its employees or agents designated to enforce these regulations.

Engineer (Designer): A Professional Engineer registered in the State of Ohio.

Erosion: The process by which the land surface is worn away by the action of water, wind, ice, or gravity; the detachment and movement of soil or rock fragments by wind, water, ice or gravity. Different types of erosion are defined below:

A. *Channel*: The erosion process whereby the volume and velocity of a concentrated flow of water wears away and alters the bed and banks.
B. *Gully*: The erosion process whereby water accumulates in narrow channels and over short periods during and immediately following rainfall or snow or ice melt, and actively removes soil from this narrow area to considerable depth such that the channels so created would not be eliminated by normal smoothing or tillage operations.
C. *Rill*: An erosion process in which numerous small channels only several inches deep are formed as a result of concentrated flow, and which if not abated can become gullies.
D. *Sheet*: The removal of a fairly uniform layer of soil from the land surface by the action of wind or water.

Erosion and Sediment Control: A system of structural and vegetative measures intended to minimize soil erosion and offsite sedimentation.

Excavation: A cut or any act by which earth, sand, gravel, rock or any other similar material is dug into, cut, quarried, removed, uncovered, displaced, relocated, or bulldozed and shall include the conditions, resulting there from and the material removed there from. The difference between a point on the original ground and a designated point of lower elevation on the final grade.

Facilities: Any structures, channels, ditches, or other improvements that are to be included in the storm water management system.

Fill: (1) Any act by which earth, sand, gravel, rock or any other similar materials placed, pushed, dumped, pulled, transported or removed to a new location above the natural surface of the ground or on top of the stripped surface or cut or an area of excavation and shall include the conditions resulting there from. The difference between a point on the original ground and a designated point of higher elevation on the final grade.

(2) The material used to create a fill.

Grading: Any stripping, cutting, filling, excavating, stockpiling, or any combination thereof and shall include any land in its cut or fill condition.

Grubbing: Removing, clearing or scalping material such as roots, stumps or sod.

Hazardous Materials: Any material (as defined by Ohio Revised Code 3750.02), substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illicit Discharge: Any direct or indirect non-storm water discharge to the storm drain system, except as exempted in Section 810.2 of these regulations.

Illegal Connection: Defined as either of the following:

A. Any drain or conveyance, whether on the surface or subsurface, which allows an illicit discharge to enter the Clermont County Separate Storm Sewer System, including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an Enforcing Official or,
B. Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by an Enforcing Official.

Impervious Surface: Those surfaces that do not allow the infiltration of storm water.

Improvements: Any modification to the existing storm water drainage system including, but not limited to, the installation of storm water conveyance systems such as paved or vegetation lined channels, ditches, or swales; the installation of storm water conduits; or the installation roadway culverts.

Industrial Activity: Activities subject to NPDES Industrial Permits as defined in the EPA Phase II Storm Water Regulations 40 CFR, Section 122.26 (b) (14).

Landslide: Rapid mass movement downslope of soil material under the influence of gravity.

Mulching: The application of suitable materials on the soil surface to conserve moisture, hold soil in place, and aid in establishment of vegetative cover.

National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit: A permit issued by EPA (or by a State of Ohio under authority delegated pursuant to the U.S. code 33 USC ' 1342(b)) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

NRCS: Natural Resources Conservation Service (formerly known as Soil Conservation Service)

Non-Storm Water Discharge: Any discharge to the storm drain system that is not composed entirely of storm water.

Permanent Vegetation: The plant materials established for the purpose of producing long term vegetative cover of the ground surface, usually after final grading is complete.

Permit: Written permission given by the CCBID to proceed with the work (earth disturbing activities) stated in the WMSC plan submittal.

Permittee: Any person to whom a WMSC Permit has been issued and who is subject to inspection under it.

Person: Any individual, association, organization, partnership, firm, corporation or other entity recognized by law and acting as either the owner or as the owner's agent.

Pollutant: Any element or property of sewage, agricultural, industrial, or commercial waste, runoff, leachate, heated effluent, or other matter whether originating at a point or non-point source. Pollutants may include, but are not limited to:

1. paints, varnishes, and solvents
2. oil and other automotive fluids
3. non-hazardous liquid and solid wastes and yard wastes
4. refuse, rubbish, garbage, litter, or other discarded or abandoned objects, regulations, accumulations, and floatables
5. pesticides, herbicides, and fertilizers
6. hazardous materials and wastes
7. sewage, fecal coliform and pathogens
8. dissolved and particulate metals
9. animal wastes
10. wastes and residues that result from constructing a building or structure
11. noxious or offensive matter of any kind

Premises: Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Project Area: The land lying within the geographical limits of the tract(s) or parcel(s) under consideration and on which the work (earth disturbing activities) will be performed.

Qualified Inspection Personnel: A person knowledgeable in the principles and practice of erosion and sediment controls, who possesses the skills to assess all conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity.

Redevelopment: The process of developing an area previously developed. Usually involves demolition of existing structure(s) and/or infrastructure.

Retention Structure: A permanent water control structure that provides for the temporary storage of storm water runoff above the normal water level of a permanent pond.

Runoff: The portion of rainfall, snow and ice melt that flows across the ground surface and is eventually returned to streams.

Sediment: Soil material, both organic and inorganic, that is in suspension, is being transported or deposited, or has been moved from its original site or origin by the action of wind, ice or gravity as a product of the erosion process.

Sedimentation: The process of action of transporting or depositing sediment.

Sediment Basin: A barrier structure built across an area of water flow to settle and retain sediment conveyed by runoff water before it can leave the project area or development site.

Sensitive Area: An area or body of water that requires special management because of its importance to the well-being of the surrounding communities, region, or the State, and includes the following:

1. Wetlands, as regulated by the Ohio EPA and/or the United States Army Corps of Engineers, discovered during on-site assessments and as noted on the National Wetlands Inventory. Note: The CCBID shall not be held responsible for determining or monitoring wetland areas.

2. Permanent and intermittent streams, ponds or lakes as determined by CCBID.

3. Aquifer Protection Zones

Settling Volume: The volume within the sediment storage zone of the settling ponds which shall either be 1000 cubic feet per disturbed acre within the watershed of the basin or shall be the volume necessary to store the sediment as calculated with Revised Universal Soil Loss Equation (RUSLE) or similar generally accepted erosion prediction model. (See section 630.4-1)

Site Development Permit: This permit is required before any earth disturbing activities can be initiated, for the purpose of developing a commercial, industrial, or subdivision development, on the development site (see development area).

Sloughing: A slip or downward movement of an extended layer of earth resulting form the undermining action of water or the earth disturbing activities that occur during construction.

Start of Construction: The first land-disturbing activity associated with a development, including land preparation such as clearing, grading and filling; installation of streets and walkways, excavation for basements, footings, piers or foundations; erection of temporary forms; and installation of accessory buildings such as garages.

Storm Water: Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation, and resulting from such precipitation.

Storm Water Management System: The combination of land grading pavement slope, open channels, underground conduits (storm sewers, culverts, underdrains), catch basins, manholes, dams, detention or retention facilities, or similar type improvements, designed according to acceptable engineering practice to properly transport, detain, store, or dispose of storm water.

Storm Water Pollution Prevention Plan (SWP3): A document which describes Best Management Practices and activities to be implemented by a person to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to storm water, storm water conveyance systems, and/or receiving waters to the maximum extent practicable.

Subarea Delineation: Indication of the separate drainage areas and their approximate sizes - *both on and off site* - that contribute to the drainage of the project area or site.

Surface Waters of the State: All streams, lakes, reservoirs, ponds, marshes, wetlands or other waterways which are situated wholly or partially within the boundaries of the state, except those private waters which do not combine or effect a junction with natural surface or underground waters.

Surveyor: A Professional Surveyor registered in the State of Ohio.

Temporary Vegetation: Short term vegetative cover used to stabilize the soil surface until final grading and installation of permanent vegetative cover.

Wastewater: Any water or other liquid, other than uncontaminated storm water, discharged from a facility.

Water Quality Volume: The volume of storm water runoff which must be captured and treated prior to discharge from the developed site after construction is complete.

Watercourse: A permanent, intermittent, perennial or ephemeral stream, river, brook, or creek for conveying water whether natural or man-made.

Watershed: The total drainage area contributing storm water runoff to a single point or watercourse. Some project areas and development sites may have more than one contributing watershed.

WMSC: Water Management and Sediment Control

WMSC Plan: Indicates the specific measures and sequencing to be used controlling sediment and erosion on a development site before, during and after construction.

WMSC Facilities: Shall include components of the storm sewer conveyance and treatment system, including pipes/conduits, catch basins, storm sewer manholes, headwalls, lined channels, outlet protection, detention/retention basins, release structures, spillways, and post-construction storm water best management practices, and all similar type improvements.

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ARTICLE 3.0 WMSC REGULATIONS GENERAL REQUIREMENTS

SECTION 300 SCOPE

300.1 The purpose of these regulations is to provide for control and management of storm water drainage, storm water detention or retention, and soil erosion and sedimentation. No person shall cause or allow earth disturbing activities on a development area except in compliance with the criteria and requirements established by these regulations.

300.2 These Water Management and Sediment Control Regulations shall apply to all earth disturbing activities involving clearing, land grading, excavation, cut, fill or other alteration on land used or being developed for commercial, industrial, residential, or other non-agricultural purposes, and shall establish criteria for the determination of the acceptability of such storm water management and sediment and erosion control practices.

300.3 Clermont County recommends that the erosion, sediment and storm water management practices used to satisfy the conditions of these regulations should meet the standards and specifications in the most current edition of Ohio's *Rainwater and Land Development* manual, or other standards acceptable to Ohio EPA.

SECTION 310 GENERAL REQUIREMENTS

310.1 The Clermont County WMSC Regulations separates earth disturbing activities into four (4) types of site development.

310.1-1 **Site development for subdivisions, commercial developments, and industrial developments.** These types of developments require a WMSC permit for site development prior to the issuance of a Building Permit. Each project will require two separate permits. A WMSC Site Preparation Permit will be issued upon approval of the plans that include the construction entrance, any BMPs such as silt fence and other erosion control measures, and any sediment traps that are required during the construction of the project. These measures are to be installed prior to any clearing and grading associated with the site other than clearing and grading associated with the installation of the BMPs. Once the work associated with the site preparation permit is completed, inspected and approved by the CCBID, a WMSC Construction Permit for the balance of the construction of the site can be issued. If the initial submittal includes all the work necessary for the entire project and the entire project is found to be in compliance with the regulation, the WMSC Construction Permit for the balance of the construction will be issued without a further submittal and review being required. Phased approval may be granted, when requested, after a separate submittal meeting the requirements of

Section 410.1-1 is made and the submittal is found to be in compliance with the regulations. The sale of individual lots or sections within the development does not relieve the permit holder from the continued responsibility to maintain the site in compliance with these regulations until one or more of the following conditions are met:

A. Final stabilization has been achieved on all portions of the site for which the permittee is responsible;

B. Another operator has assumed control over all areas of the site that have not been finally stabilized;

C. (For residential construction only) Temporary stabilization has been completed and the lot, which includes a home, has been transferred to the homeowner.

1. Residential subdivision development shall include all proposed developments intended to divide existing tracts or parcels into a number of lots, streets, and open areas. All developments with lots greater than five (5) acres that do not need prior approval by the Planning Commission are included in this category.

2. Residential subdivisions that are of sufficient size to necessitate their further being developed in blocks or sections shall require a separate WMSC plan for each of the particular blocks or sections unless prior approval form the CCBID has been given releasing the developer from this requirement.

3. Multi-family and commercial/industrial developments shall include all proposed developments that are intended to divide existing tracts or parcels or to use the entire tract or parcel for apartment/ condominium projects, commercial or industrial developments, and other such similar uses.

310.1-2 **Site development for single commercial or industrial buildings, including additions and accessory buildings.** These buildings require a WMSC plan whose complexity is dependent on the requirements and characteristics of the building site and proposed development. The WMSC plan required will be submitted along with the building plans and each set of building plans submitted will require a site plan.

310.1-3 **Construction of residential homes that are located in approved subdivisions and residential homes on single lots of any size, including additions and accessory buildings.** An approved subdivision is one that has received prior formal or final approval from the Clermont County Planning Commission.

310.1-4 **Cut, Fill or Grading on existing parcel(s) or lot(s) includes, but is not limited to, the following factors and requirements:**

A. Includes grading for maintenance measures, landscaping purposes, improvements, etc.

B. A Permit may be required, if the existing surface drainage is altered or if the proposed work within the project area constitutes a potential erosion hazard or acts as a source of sediment subject to any watercourse or adjacent lands.

C. A permit shall be obtained when the cut or fill required in connection with a drainage improvement not in the public right-of-way exceeds 100 cubic yards, or when the area of land disturbed is one acre or greater.

310.2 **Detention Requirements:** Each development shall provide for the detention of excess storm water runoff resulting from that development. Excess storm water runoff shall include all additional runoff resulting from increases in the impervious surfaces of the site, including all additions of buildings, roads, and parking lots; modification in contours, including excavation of fill, alteration of drainage ways, and re-grading of slopes, as compared to the condition of the site prior to development.

Exception #1: Detention structures may not be required if the requirements of 310.2-1 are met in an approved innovative manner.
Exception #2: On-site detention may not be required in systems approved in accordance with Section 500.4.
Exception #3: On-site detention may not be needed if the storage and treatment required under Article 5.0 are provided by a regional storm water management facility approved by CCBID, and a legal agreement is established through which the owner of the regional facility agrees to be responsible for its long-term operation and maintenance.

Design and performance criteria for existing or proposed storm water management facilities (both subdivision and individual building sites) with construction drawings that have been approved prior to the effective date of these regulations, shall comply with the WMSC regulations in force on the date originally approved.

310.2-1 For the purposes of these regulations, storm water detention shall be required when the critical storm is equal to two (2) years or greater. If no detention is required, the offsite runoff velocities must be equal to or less than either the one (1) year pre-developed rate or rates specified in State storm water guidance manuals, whichever is more protective of the receiving stream as determined by the County.

310.2-2 Post-construction BMPs cannot be installed within a surface water of the State (e.g., wetland or stream) unless it is authorized by a CWA 401 water quality certification, CWA 404 permit, and/or Ohio EPA non-jurisdictional wetland/stream program approval.

310.2-3 Capacity of detention shall be determined by the amount of runoff draining to the detention structure, including that coming from off-site.

The release point(s) of any detention/retention basin and/or other storm water management system shall be designed such that the post-development released storm water flow emulates the pre-developed flow volume and characteristics as it is released onto the adjacent property for the 1-, 2-, 5-, 10-, 25-, 50-, and 100-year rainfall events. If the pre-development flow characteristics cannot be emulated, the engineer must demonstrate that there is adequate capacity in the downstream storm sewer system, ditch, culvert, stream, overland flow route, etc. to accept the discharge from the above rainfall events and that the downstream topographic features will not be eroded or flooded by modifications to the storm flow characteristics. It may be necessary for the engineer to provide a detailed hydraulic analysis of the downstream storm water system or overland flow route to demonstrate that there is adequate capacity in the downstream system. "Adequate capacity" is determined by engineering analysis to confirm that downstream structures, if properly maintained, would be capable of accommodating the flow, velocities would not increase to erosive speeds, and proposed uses of off-site properties would not be impaired. If analyses indicate that the downstream system is properly maintained and would not be able to accommodate the change in flow rate or characteristics, or is not adequate to accept the proposed peak discharges, the allowable detention/retention basin discharge must be reduced or the downstream system must be modified to accommodate the changed flow characteristics by the applicant as part of the overall development. This analysis shall extend to the convergence with the first downstream perennial stream.

310.2-4 Storm water BMPs may only be installed in the public right of way if they conform to specifications contained in the current version of the Ohio Department of Transportation's "Location and Design Manual, Volume Two Drainage Design."

310.2-5 No retention is permitted to be located within the airport's approach zones or within the airport's transition zone as defined in the *Clermont County Airport Zoning Regulations* as adopted by the Clermont County Board of County Commissioners. Detention structures within these areas are to be designed to hold water no longer than 48 hours and remain dry during periods between storms. See Appendix B for a map of the affected areas of the county.

SECTION 320 WMSC PERMIT EXEMPTIONS

320.1 Any person(s) or entity(s) responsible for developing property must comply with the provisions of these regulations. Submittal of specific information shall be required to determine compliance with these regulations. However, a WMSC Permit will not be required for the following:

A. Any emergency activity which is immediately necessary for the protection of life, property or natural resources. After the immediate conditions which created the emergency are abated, but not less than three (3) calendar days, an application submittal of specific information shall be required to determine compliance with these regulations.

B. Excavations below finished grade for drain fields accessory to one, two or three family dwellings (including household sewage disposal systems permitted by the Clermont County Public Health), tanks, vaults, tunnels, equipment vaults, swimming pools or similar earth moving activities. The placement of the spoils from such excavation shall be subject to the regulations contained within this document.

C. Excavation or removal of vegetation in public utility easements by a public utility for the purpose of installing underground utilities, provided the utility has obtained coverage under Ohio EPA's Construction General Permit, and where the public utility has standard sediment control practices that have been approved by Board of Clermont County Commissioners or the Chief of the Division of Soil and Water Conservation of the Ohio Department of Agriculture and provided further that such sediment control practices are no less stringent that these WMSC regulations

SECTION 330 VIOLATIONS, ORDERS, AND PERMIT REVOCATIONS

330.1 Inspections shall be conducted by the CCBID. If, at any time during the course of construction, it is evident to the CCBID that the construction or earth disturbing activity has caused the existing drainage in the general area to be impaired, created an erosion hazard, or become a source of sediment to any adjacent storm water drainage system, public watercourse or any land, CCBID shall:

330.1-1 Verbally notify the responsible person that such activities are deficient and to take measures necessary to correct the situation within a specified length of time.

330.1-2 If permittee continues work in violation of these regulations, action shall be taken by the CCBID in accordance with Section 307.79 Ohio Revised Code.

330.1-3 In addition to the other actions taken by the Clermont County Board of Commissioners when corrective measures are not completed, the Chief Building Official shall withhold the issuance of a Certificate of Occupancy for any building constructed on the project area until measures are taken to bring the activities into compliance with these regulations.

330.2 Permit revocation may be required if the steps taken in Section 330.1-3 are not sufficient to assure compliance of the permittee with these regulations or if the development of the site is done in such a manner as to adversely affect the health, safety, or welfare of person(s) residing or working in the vicinity of the project area, or if the development is detrimental to the public health or welfare.

330.3 Work stopped or abandoned by the owner in an incomplete manner for a period of one (1) year shall cause the permit to become invalid. The Chief Building Official shall require the owner to provide all necessary precautions to ensure that the incomplete work does not become a hazard or a nuisance.

SECTION 340 NUISANCES

340.1 No persons(s) or entity(s) shall create conditions that cause increased storm water flow onto adjacent lands, impair the existing drainage system, create an erosion hazard, or become a source of sediment to any adjacent storm water drainage system, public watercourse or any land in the unincorporated areas of Clermont County, nor shall any person(s) or entity(s) create a nuisance in regard to Water Management and Sediment Control policies in the unincorporated lands of Clermont County.

340.2 These regulations shall not be construed as authorizing any person(s) or entity(s) to maintain a private or public nuisance on property, and compliance with the provisions of these regulations shall not be a defense in any action to abate such a nuisance.

SECTION 350 RESPONSIBILITY

350.1 Failure of the CCBID to observe or recognize hazardous or unsightly conditions or to recommend corrective measures shall not relieve any person(s) or entity(s) from the responsibility for the condition or damage resulting there from, and shall not be construed to result in the Board of County Commissioners or CCBID, its officers, employees, or agents being responsible for any condition or damage resulting there from.

ARTICLE 4.0 WMSC PLAN SUBMITTAL REQUIREMENTS

SECTION 400 SCOPE

400.1 In concurrence with Section 310 of the General Requirements, the WMSC plan submittal requirements will be separated into four types of site development: **(1)** those requiring a Site Development Permit to begin earth disturbing activities prior to obtaining building permits for the individual buildings; **(2)** construction of single commercial and industrial buildings; **(3)** construction of residential housing within an approved subdivision, located on single lots of any size, or located in a subdivision development with lots that are greater than five (5) acres in size (those not requiring Planning Commission approval); and **(4)** cut, fill, or grading on existing parcel(s) or lot(s) that exceeds 100 cubic yards or disturbs one acre or more of land and relates to site development or drainage improvement, or if the existing drainage is altered or impaired and the earth disturbing activities constitute an erosion/sediment hazard.

400.2 All lots, tracts, or parcels shall be graded to provide proper drainage away from buildings and convey it to a stable receiving outlet at non-erosive velocities as defined in Section 630.2-3. Each lot shall be graded in accordance with an approved storm water management plan. All grading and drainage shall be subject to approval by the CCBID. Downspout and sump pump storm water discharge, when piped below ground, shall be dispersed onto the ground surface no closer than five (5) feet to adjoining properties. All grading and drainage shall be subject to approval by the CCBID.

400.3 All drainage improvements shall be as such designed to adequately handle storm water runoff according to the requirements of these WMSC Regulations. Concentration of surface water runoff shall only be permitted in swales or watercourses where calculations indicate (prove) there is no adverse impact on the receiving swale or watercourse or increased flooding potential downstream.

SECTION 410 WMSC PLAN REQUIREMENTS

410.1 **Requirements for Site Development Permit** (to be obtained before any earth disturbing activities can be initiated)

410.1-1 Preliminary (Design Plan Review) Plan Requirements

A. Preliminary Review Fee
B. Site Development Permit application form
C. Project Description Form or Narrative.
D. Vicinity Map
E. Total area of the site and the area of the site that is expected to be disturbed.
F. A measure of the impervious area and the percent imperviousness created by the construction activity (existing, new and total impervious area after construction).
G. Site Plan
- (1) Two (2) foot maximum contour intervals for existing and proposed condition(s). These regulations recognize the fact that these contours are not final and are subject to change at the final design stage. Interpolation of USGS maps is acceptable. Also, five (5) foot contour intervals may be appropriate for steeply sloping areas.
- (2) A 1" = 100' maximum scale.
- (3) Indicate existing or man-made watercourses and wetlands.
- (4) Show proposed locations of storm water management systems or features such as:
  - (a) Detention/retention basins
  - (b) Storm water conveyance systems
  - (c) Stream buffers
  - (d) Other storm water management practices
  - (e) Proposed easements for WMSC facilities, where applicable.
- (5) Show approximate limits of proposed grading or stripping.
- (6) Indicate onsite and offsite watershed routing and drainage sub areas.
- (7) Indicate all lots or units.
- (8) Indicate previous land use.
- (9) Indicate the extent of and provide a description of any wetlands.

H. Subarea Delineation
- (1) Required when more than one (1) drainage sub area is to be included in the storm water calculations.

I. Indicate areas and locations of adjacent watersheds that will be critical to the onsite storm water management design.
J. Data Resource Map (soils map)
- (1) Required if more than one type of soil is present on site.

K. Storm water Analysis
- (1) Indicate Design Method
  - (a) SCS-TR55 Method
  - (b) SCS-TR20 Method
  - (c) Rational Method - valid for areas of fifty (50) acres or less.
  - (d) Other methods can be submitted with previous approval before submittal.
- (2) Calculate Critical Storm from Section 510
- (3) Calculate estimated volume of detention when possible.

L. Requests for public (County) maintenance of specific WMSC facilities shall follow the requirements set forth in the current edition of the Clermont County Subdivision Regulations, and shall be submitted along with the preliminary design plan.

M. One (1) copy of the preliminary design plan and calculations shall be submitted to the CCBID for review.

N. The preliminary design plan submittal shall not be limited to the items listed in Section 410.1-1. Any additional information submitted to the CCBID for the preliminary plan will be reviewed.

410.1-2 Final Construction & Improvement Plan Requirements

A. Permit Fee

B. Site Development Permit Application

C. Project Description Form or Narrative

D. Vicinity Map showing the following:
- (1) Drawn to a scale of not less than 1" to 2000'.
- (2) Surface waters including ponds, lakes, streams wetlands on or within 200 feet of the site, and the first subsequent named watercourse.
- (3) Areas that could be affected by storm water runoff from the project site or offsite areas that will affect the drainage patterns of the project site and/or the offsite areas.
- (4) Offsite areas of the watershed that are included in the storm water calculations for backwater stream analysis. This information should be submitted as a separate map for more complicated development sites.

E. Site plan shall include, but not be limited to, the following items:
- (1) Drawn to a scale of not less than 1" = 50'.
- (2) Certified by a registered Professional Engineer or Surveyor in the State of Ohio.
- (3) Name of proposed project, title, scale, north arrow, legend and date of all plan maps, name and address of the person(s) preparing the plan, the owner(s), and the person(s) responsible for developing the area.

(4) Name and contact information of the construction site operator.

(5) Delineation of tracts, parcels, or lots of land, including previous land use.

(6) Indicate the existing topography of the development site with a maximum distance of two (2) feet between contour intervals. It may be necessary to indicate one (1) foot intervals for areas that are predominantly flat and five (5) foot contour intervals for steeply sloping (ravine or valley) locations; discretion is left to the designer and subject to approval by the CCBID.

(7) Indicate the area and show the limits of the site to be disturbed (i.e. grubbing, clearing, excavation, filling or grading, including off-site borrow areas.

(8) Soil types shall be depicted for all areas of the site, including locations of unstable or highly erodible soils.

(9) Show elevations of finished grade, lowest (first) floor of buildings, and other structures. First floor elevations for individual residential homes are not required unless it is critical for proper drainage.

(10) Show project areas profiles for, but not limited to, the following:
- (a) Cut and fill areas (or can indicate finished slopes directly on site plan if adequate).
- (b) Existing and proposed drainage systems.
- (c) Existing and proposed final grades.

(11) Show cross-sections of, but not limited to, the following:
- (a) Emergency spillway
- (b) Paved, sod, or rip-rap channels

(12) Show all existing and proposed easements for sanitary/ storm water runoff piping and structures - including detention or retention facilities and 100 year storm elevation for flood determination.

(13) Show all existing drainage areas, patterns, and facilities such as natural or man-made watercourses, retention/detention basins, or similar improvements.

(14) Indicate the location for all proposed post-construction storm water management and pre-treatment facilities and include (at a minimum) the following, when needed:
- (a) Inlet details; invert elevations, pipe sizes.
- (b) Emergency overflow limits and facilities.
- (c) Erosion protection for all outlets into basin.
- (d) Headwall details at inlets/outlets.
- (e) Anti-seep collar and riser details where required (typically for retention basins).

(f) Release structure details including:
1. Orifice or restrictor plate sizes and invert elevations.
2. Weir shapes, sizes, and elevations.
3. Window sizes and elevations.

(15) If more than one (1) drainage area is used for the storm water runoff calculations, indicate all drainage sub areas on the site plan. This typically requires the areas to be shown on a separate copy of the site plan for plan clarity.

(16) Indicate watershed routing through the site on the plan or in the narrative/description of project form.

(17) Erosion and sediment control notes to be recorded on the site plan include, but are not limited to, the following:
(a) Construction Sequence of major construction operations (i.e., designation of preserved areas, grubbing, excavating, grading, utilities, infrastructure installation and others), and the implementation of erosion, sediment and storm water management practices or facilities to be employed during each operation of the sequence.
(b) Temporary, permanent, and dormant seeding specifications and mulching specifications for critical areas.
(c) Filter barrier, and silt fence placement notes and details where required.
(d) Storm drain inlet protection notes and details where required.
(e) Jute mat protection (or its equivalent, does not need to be biodegradable) for final slopes greater than three (3) horizontal to one (1) vertical is required.
(f) Erosion and Sediment Control Plan Criteria (see Section 620 of the WMSC Regulations) and general notes.

(18) The locations of all erosion and sediment control, storm water conveyance, and structural practices are to be shown and labeled on the site plan. This includes all temporary erosion and sediment controls, such as protection and all permanent storm water best management practices to be used to control storm water runoff and pollutants after construction practices have been completed, including retention and detention ponds, stream buffers and other controls. For subdivided developments, a drawing of a typical individual lot showing standard individual lot erosion and sediment control practices

(19) Sediment traps and basins noting their sediment storage and dewatering (detention) volume and contributing drainage area.

(20) The location of designated construction entrances where vehicles will access the construction site.

(21) The location of any areas of floodplain fill, floodplain excavation, stream restoration or stream crossings.

(22) The location and description of discharges associated with dedicated asphalt and/or concrete plants and the BMPs to address pollutants in these discharges.

(23) Areas designated for the storage or disposal of solid, sanitary and toxic wastes, including dumpster areas, areas designated for cement truck washout, and vehicle fueling. No solid or liquid waste, including building materials, shall be discharged in storm water runoff. Under no circumstances shall concrete trucks wash out directly into a drainageway, storm sewer or watercourse.

(24) Indicate the extent and provide a description of any wetlands. If the project disturbs any surface natural watercourses or wetlands, the permittee must contact the appropriate U.S. Army Corps of Engineers and Ohio EPA offices.

F. Subarea delineation map.

G. Indicate offsite watershed contributions to design calculations and their locations.

H. Data Resource Map required for sites with multiple soil types. Please include this information on the Project Description Form or the Narrative if a Data Resource Map is deemed unnecessary.

I. Storm water analysis as described in Sections 510 and 520.

J. Storm water calculations, including volumetric runoff coefficients for both pre- and post-construction site conditions and resulting water quality volume.

K. Design details for post-construction storm water facilities, including contributing drainage areas, capacities, elevations, outlet details and drain times.

L. An implementation schedule which describes the sequence of major construction operations (e.g., grubbing, excavating, grading, utilities and infrastructure installation and others) and the implementation of erosion, sediment and storm water practices to be employed during each operation of the sequence.

M. Ohio EPA NPDES Permit Number and other applicable state and federal permit numbers or approvals, or the status of permit applications if final approvals have not been received.

N. The applicant shall submit formal plan construction drawings and related details and storm water design calculations to the CCBID in accordance with the existing Clermont County Subdivision Regulations.

O. The formal (final) design submittal shall not be limited to items A. through L. listed in Section 410.1-2. Additional calculations and details may be required by the review agency.

410.1-3 A WMSC permit for site development, per Section 310.1-1, shall be issued to the applicant upon approval of the final construction plans and the payment of all fees. The applicant or developer is to then notify the CCBID within seven (7) days of the first earth disturbing activities. The holder of the permit must be able to produce the permit with a set of approved plans, a written document containing the signatures of all contractors and subcontractors involved and display the permit onsite.

410.2 **Commercial and industrial buildings that occur, typically, on single lots.** The following information shall be submitted to the CCBID, with the appropriate fees, to fulfill the water management and sediment control requirements necessary for a Building Permit application. **A separate WMSC Permit will not be required.**

410.2-1 No preliminary plan submittal is required.

410.2-2 Final WMSC Design Plan requirements shall be submitted as described in the following statements:

A. One (1) copy of the following is to be submitted along with the building plans to the CCBID:

   1. Project Description Form or Narrative
   2. All design calculations to be stamped by a Registered Professional Engineer in the State of Ohio.
   3. Any additional details required for the WMSC Final Plan approval.

B. A site plan stamped by a Registered Professional Engineer or Surveyor in the State of Ohio and any construction drawings containing details essential to the water management and sediment control plan must accompany each set of building permit plans submitted to the CCBID.

C. The final design requirements for the site plan, including WMSC details listed in Section 410.1-2, items A through O. The WMSC requirements must be satisfied before a Building Permit can be issued for the project.

410.3 **Residential housing within a subdivision or an approved development, or located on single lots.**

410.3-1 No preliminary plan submittal is required.

410.3-2 A site plan, indicating sediment and erosion control measures shall be submitted with each set of building plans for One, Two and Three Family Dwellings with the appropriate fees. If the development disturbs one or more acre of ground, the site plan must include details listed in Section 410.1-2, items A through O. Items associated with post-construction management practices do not be provided if such practices are not required.

410.4 **Cut, Fill or Grading on existing parcel(s) or lot(s).**

410.4-1 No preliminary plans are required.

410.4-2 A site plan, with the appropriate fees, indicating sediment and erosion control measures, the existing and proposed drainage systems as well as any other information required by the CCBID or the reviewing engineer to satisfy the requirements of these regulations. If the cut, fill or grading activities disturb one or more acre of ground, the site plan must include details listed in Section 410.1-2, items A through O. Items associated with post-construction management practices do not be provided if such practices are not required.

410.4-3 Storm water management calculations prepared by a Professional Engineer Registered by the State of Ohio, if necessary, to satisfy the requirements of these regulations.

410.5 It is the intention of these regulations that the submission requirements although specific, are to be considered minimum requirements. The CCBID or any agency charged with enforcement of these regulations may require more detailed design specifications or plans when a particular problem is identified or if a proposed storm water management system may jeopardize sensitive or regulated areas. Where a design may result in water management or sediment control that is not adequate to protect the health, welfare, and safety or property of an effected area, the agency enforcing the regulations may require re-submittals of revised design plans or may require submittals involving specific technical resolutions to these problems rather than to simply deny the application outright. All applicants are further on notice that the plan requirements must meet applicable regulations of the Clermont County Public Health, the Clermont County Engineer and/or the Clermont County Planning Commission in addition to these specific regulations in order to be approved for implementation.

410.6 For developments that will be further subdivided into sections or phases and constructed separately with a significant amount of time between the construction of each section or phase, separate WMSC formal (final) design plans may be required for individual sections or phases, or provisions shall be made to adequately handle the storm water runoff until completion of the entire development.

410.7 The permittee shall amend the WMSC plan whenever there is a significant change as determined by the CCBID in design, construction, operation or maintenance, or if the plan proves to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity. Amendments to the WMSC Plan shall be reviewed by the CCBID in the same manner as the original plan.

410.8 A copy of the WMSC Plan must be kept on site and made available immediately upon the request of CCBID personnel or CCBID's authorized representative during working hours.

410.9 The WMSC Permit is invalid if the approved work has not commenced within twelve months of the issuance of the permit. One extension shall be granted for an additional twelve-month period if requested in advance of the expiration of the Permit and upon payment of an Extension Fee. The permit remains valid provided construction activities are ongoing. The permit shall expire when construction activity is suspended for more than six months. Two extensions shall be granted for six months each if requested in advance of the expirations of the Permit and upon payment of an Extension Fee for each extension.

SECTION 420 FEES

420.1 The Clermont County Board of Commissioners, in conformance with Section 307.79 of the Ohio Revised Code, shall establish reasonable filing fees for plan review and site inspection. By separate resolution the Board shall revise the fees as is deemed necessary.

420.2 A permit to begin new construction or earth disturbing activities relating to new construction will not be issued until all fees have been paid.

420.3 Additional review fees will be assessed when plan or design changes by the owner, contractor, developer, or engineer require another extensive plan review.

420.4 All proposed developments shall be required to obtain a WMSC Permit prior to beginning any earth disturbing activities.

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ARTICLE 5.0 WMSC REGULATIONS STORM WATER DESIGN CRITERIA

SECTION 500 SCOPE

500.1 Each development, redevelopment or project site shall provide for the detention of the excess storm water runoff resulting from the proposed development. To prevent downstream damages, peak rates of runoff from an area after development or redevelopment shall be no greater than the peak rates of runoff from the area prior to the proposed development as per Table III of Section 510.3-2.

500.2 The site design shall incorporate storm water runoff volumes that are kept to a minimum. Site development practices that reduce impervious areas, utilize infiltration and preserve the existing natural conditions are encouraged.

500.3 Storm water runoff velocities shall be kept to a minimum through the use of rip-rap or other type of channel protection to minimize the erosion of the existing watercourse due to the increased velocities that occur from the addition of man-made storm water conveyance systems, such as culverts, pipes, and open channels.

500.4 It is not the intent of this section or of these regulations to restrict the freedom of the design engineer to the design methods listed in this article, but these methods are recommended for the purpose of complying with these regulations. Other methods of design may be used with prior approval from the CCBID.

SECTION 510 WMSC CRITICAL STORM CRITERIA

510.1 **Critical Storm Definition:** The Critical Storm value for a particular project or development site provides the design engineer with the following:

510.1-1 A critical storm frequency that reflects the changes in land surface that occur to a particular project area after development. **Critical storm calculations shall utilize onsite drainage areas.**

510.1-2 Offsite areas that contribute to the control basin shall be accounted for in the detention basin storage design. The offsite areas will not be used in the calculation of the Critical Storm. The offsite areas will be used in the determination of the required storage volume of the control basin.

510.1-3 Insight as to whether or not onsite storm water detention will be required, at the preliminary design stage.

510.2 Critical Storm Determination Utilizing the SCS-TR55 Method

The engineer should have access to a copy of *Urban Hydrology for Small Watersheds - 2nd Edition (Technical Release No. 55),* United States Department of Agriculture, Natural Resources Conservation Service, Conservation Engineering Division. This manual will be known as NRCS-TR55 for the purposes of these specifications. To assist the designer, worksheets from the NRCS-TR55 manual have been included in these regulations in Appendix A - Exhibit II, Sheets D-2 through D-8. The Critical Storm value can then be calculated using the following step by step procedure:

510.2-1 Calculate the volume of runoff, V_{pre}, under pre-development conditions for a storm frequency equal one (1) year, of 24-hours duration.

A. Curve Number (CN) Determination. The Runoff curve number (CN) for the pre-developed shall not exceed those of "Open Space in Fair Condition" (i.e. A=49, B=69, C=79, D=84) as stated in Table 2-2a of the NRCS-TR55 Manual.

For areas disturbed by construction activity, post-developed runoff curve numbers shall use Hydrologic Soil Group D for all Cover Type and Hydrologic Conditions as stated in Table 2-2a of the NRCS-TR55 Manual. The runoff curve numbers found in the manual reflect the ground cover characteristics for a particular project or development site. A weighted value may be necessary because of the variety ground cover conditions that can occur on one site.

B. The soil storage capacity, S, of the soil is then calculated from the weighted curve number by using equation 2-4 from Chapter 2 of the NRCS-TR55 Manual:

$$S = (1000/CN) - 10 \qquad \text{Eqn. 510.2-1}$$

C. The quantity of runoff, Q, can then be determined from the storage capacity and the rainfall intensity of the area. The rainfall intensity values, P, for Clermont County for twenty-four (24) hour duration storms for various frequencies are listed below in Table I. Equation 2-3 from Chapter 2 of the NRCS-TR55 Manual is as follows:

$$Q = (P - 0.2S)^2 / (P + .08S) \text{ inches} \qquad \text{Eqn. 510.2-2}$$

FREQUENCY (years)	INTENSITY, P (in/acre-ft)
1	2.4
2	2.9
5	3.6
10	4.1
25	4.7
50	5.1
100	5.6

TABLE I

D. Runoff volume determination

$$V_{pre} = [Q_{pre}^{(in)} / 12 \text{ in/ft}] * 43560 \text{ ft}^2/\text{acre} * A \text{ (acres)}$$

V_{pre} = cubic feet

510.2-2 Steps 1.A, 1.B, 1.C and 1.D are then repeated for the post-development site conditions (the post-development curve number will reflect the addition of impervious surfaces) to obtain the volume of runoff, V_{post}, for a one (1) frequency storm for the post-development conditions.

510.2-3 Equation 510.2-3 is then used to determine the percent change in volume of runoff due to the development of the site.

$$[(V_{post} / V_{pre}) - 1.0] * 100\% = PC \qquad \text{Eqn. 510.2-3}$$

510.2-4 Use Table II, below, to determine the critical storm based on PC, the percent change.

≤ PC <		CRITICAL STORM FREQUENCY
___	10	1 year
10	20	2 year
20	50	5 year
50	100	10 year
100	250	25 year
250	500	50 year
500	B	100 year

TABLE II (from Ohio Critical Storm Method)

510.2-5 See Appendix A - Exhibit II, Sheet D-2 for the worksheet used to determine the curve numbers and runoff for pre and post development conditions.

510.3 Critical Storm Determination Utilizing the Rational Method

The information required to calculate the pre and post development flows for a particular project using the rational method are included in these regulations. The following is a step by step procedure for determining the percent change in flow for post versus pre development conditions.

510.3-1 The Rational Method design is limited to areas that are fifty (50) acres or less for purposes of these regulations

510.3-2 Find Q_{pre} for a one (1) year frequency and a given storm duration (concentration time of runoff) under pre-development conditions, through the use of Eqn. 510.3-1 shown below:

$$Q = C * I * A \qquad \text{Eqn. 510.3-1}$$

Where: Q = flow in cfs
C = runoff coefficient
I = rainfall intensity
A = drainage area for the project site

A. Determination of the runoff coefficient (s), C
Table III shows a list of runoff coefficients for various pre and post development conditions.

SITE CONDITION	COEFFICIENT, C	
	Less Than 2%	6% or Greater
Commercial/Industrial	0.80	0.90
Residential		
Single Family < 1 acre	0.50	0.60
1 acre	0.45	0.55
1+ acres	0.40	0.50
Multi-Family (**A**)	0.70	0.80
Parking Lots, Driveways, Etc.	0.95	0.95
Roofs, Imperious Surfaces	0.95	0.95
Redeveloped Existing Imperious Surfaces	0.30	0.30
Gravel	0.95	0.95
Lawns		
Up to a 2% Slope	0.20	
2% to 7% Slope	0.25	
Over 7% Slope		0.30
Farmland	0.30	0.40
Grassland	0.30	0.40
Woodland	0.25	0.35

(**A**) The runoff coefficient for multi-family residences may need to be found using a weighted value based on the amount of impervious surfaces and vegetated cover instead of using C = 0.70

TABLE III

(1) A weighted C value will need to be calculated when more than one (1) of the above conditions exist on a particular project or development site.

B. Determination of the Rainfall Intensity, I

Table IV indicates rainfall intensity values in relation to runoff time of concentration (storm duration), tc, and storm frequency. For areas of 30 acres or less, tc values typically range from five (5) minutes to thirty (30) minutes.

C. Time of Concentration, tc:

Time of concentration, tc, is the time it takes for runoff to travel from the hydraulically most distant point to a point of reference or interest downstream. The chart in Appendix A - Exhibit I provides a graphical method for estimating overland flow time. This chart may be used to estimate the time for runoff to travel from the furthest point to an inlet or a defined channel.

Time of Concentration, t_c, is measured in minutes for use in Table IV.

FREQUENCY (YRS)	INTENSITY, I (IN/HR) $a / (t_c + b)$
1	$80 / (t_c + 14)$
2	$106 / (t_c + 17)$
5	$131 / (t_c + 19)$
10	$170 / (t_c + 23)$
25	$230 / (t_c + 30)$
50	$250 / (t_c + 27)$
100	$290 / (t_c + 31)$

TABLE IV

D. Equation 510.3-2 can then be used to find the percent change in runoff between the pre and post development conditions.

$$[(Q_{post} / Q_{pre}) - 1.0] * 100\% = PC \quad \text{Eqn. 510.3-2}$$

E. The Critical Storm value can be determined from Table II in Section 510.

510.4 Critical Storm Controls

510.4-1 The peak rate of runoff from the Critical Storm and all more frequent storms occurring on the development or project area shall not exceed the peak rate of runoff from a one (1) frequency storm of 24 hours duration that would occur under pre-development conditions. For example, if the critical storm was calculated to be a ten (10) year frequency storm, the peak rate of storm water runoff that would occur from the two (2), five (5), and ten (10) year post-development storms could not exceed the peak rate of runoff that would occur from one (1) year frequency storm under pre-development conditions. A one (1) year critical storm value may not require detention, but the outlet velocities must be equal to or less than the one (1) year pre-development outlet velocities.

510.4-2 Storms of less frequency occurrence than the critical storm up to the one hundred (100) year storm shall have peak rates of runoff equal to or less than the peak rates of runoff for the same frequency of storms under pre-development conditions. As shown in Table II, the one (1), two (2), five (5), ten (10), twenty five (25), fifty (50), and one hundred (100) year storm frequencies are considered adequate for these regulations.

SECTION 520 WMSC DESIGN METHODS

520.1 NR**CS-TR55 Method**

This method can be used for all project or development sizes for the purpose of these regulations. After determining the Critical Storm frequency described in Section 510 of these regulations, the following steps are needed to determine if onsite storm water detention is needed and what volume of detention will be required.

It should be noted that the flow, Q, and volume, V, that were found during the critical storm calculation pertain to onsite drainage areas only. In designing the storm water management system for the development site, offsite drainage areas will need to be considered for the design of culverts, open channels, storm sewers, detention/ retention basins, and other drainage improvements.

520.1-1 Determine T_c, Time of Concentration

The definition given in Section 510.3-2.C for the time of concentration is valid for the NRCS-T55 Method, but does require further explanation of the components that make up the T_c for a particular development site.

$$T_c = T_{t1} + T_{t2} + ... + T_{tm} \qquad \text{Eqn. 520.1-1}$$

Where: T_t = Travel time (in hours) for a particular segment of the storm water conveyance system.
m = Number of flow segments

520.1-2 Computation of Travel Time, T_t

Water moves through a watershed as [1]sheet flow, [2]shallow concentrated flow, [3]open channel flow, or a combination of these flows. The type of flow that occurs for a particular storm water conveyance system and development site is best determined by field inspection and engineering judgment.

A. Sheet Flow

$$T_t = [\ (0.007)\ (n * L)^{0.8}] / [(P_2)^{0.5}(s)^{0.4}] \qquad \text{Eqn.520.1-2}$$

Where: T_t = travel time (in hours)
n = Manning's roughness coefficient
L = flow length, 300 ft. maximum
P_2 = 2-year, 24 hour rainfall (ins.)
s = slope of land (ft/ft)

B. Shallow Concentrated Flow

$$T_t = L / (3600 * V) \qquad \text{Eqn. 520.1-3}$$

Where: T_t = travel time
L = flow length
V = average velocity

C. Channel Flow

$$T_t = L / (3600 * V_m) \qquad \text{Eqn. 520.1-4}$$

Where: T_t = travel time
L = flow length
$V_m = [1.49(r)^{2/3}(s)^2]\ /\ n$

Where: V_m = average velocity (ft/sec)
r = hydraulic radius
s = slope
n = Manning's roughness coefficient

D. In watersheds with storm sewers, carefully identify the appropriate hydraulic flow path to estimate Tc. Storm sewers normally handle only a small portion of a large storm event.

E. See worksheet in Appendix A - Exhibit II, Sheet D-3 for time of concentration calculation.

520.1-3 Peak Flow Determination

A. Graphical Method

$$q_p = q_u * A_m * Q * F_p \qquad \text{Eqn. 520.1-5}$$

Where: q_p = peak flow (cfs)
q_u = unit peak flow (csm/in)
A_m = total site area (mi^2)
Q = runoff (ins) See Eqn. 510.2-2
F_p = pond and swamp adjustment factor

1. The worksheet in Appendix A - Exhibit II, Sheet D-4 can be used to determine the peak flow for both the pre and post development site conditions.

2. Limitations to this method are as follows:

    a. Can only be used for developments and project areas that have only one distinct drainage area.
    b. The drainage area can typically contain only one major stream.
    c. Provides a determination of peak flow only.
    d. Cannot perform reservoir routing.

B. Tabular Hydrograph Method

1. This method is applicable for estimating the effects of land use change (development) in a portion of a watershed. It is effective in determining the composite hydrograph that results from the contributions of the defined subareas that are present in the watershed, while also measuring the change in runoff volume that occurs due to development of the land.

2. The entire watershed contributions to the development site or project area must be shown on the site plan and in the design calculations to achieve a better estimation of the increased storm water flow that has occurred due to development.
3. The tabular method should be used when watershed subdivision into two (2) or more subareas is required for a particular development site or project area.
4. Follow the steps indicated in Chapter 5 of the NRCS-TR55 Manual to use the tabular hydrograph method. See Appendix A- Exhibit II, Sheets D-5 and D-6 for the worksheets used to find the peak flow for the composite hydrograph at a particular point of interest. The point of interest could be located where the storm water runoff leaves the development site or enters a culvert.
5. The following limitations apply to the tabular hydrograph method:

    a. The accuracy of this method decreases as the complexity of the watershed increases.
    b. If the drainage areas of individual subareas differ by a factor of 5 or more, the accuracy of the method decreases.
    c. The travel time, Tt, for a particular sub area must be equal to or less than three (3) hours.
    d. The time of concentration, Tc, for a particular sub area must be equal to or less than two (2) hours.

520.1-4 Volume of Detention Determination

A. The detention basin is the most widely used form of controlling peak storm water flow caused by the development of the site in question. The method used in Chapter 6 of the SCS-TR55 manual assists the designer in calculating a quick estimate for the amount of storage required. The estimate is valid for both single and multiple stage outflow devices. The following constraints apply when using this method for multi-stage outlets:

1. Each stage requires a design storm and a computation of the storage required for it.
2. The flow(s) from the upper stage(s) must include the flow(s) from the lower stage(s).

B. The designer should be aware that this method is not to be used for final design if an overestimation of 25% is not satisfactory.

C. This method has been found to be effective for final design of small detention basins.

D. See Appendix A - Exhibit II, Sheets D-7 and D-8 for the worksheets provided to calculate the required storage volume by this method.

E. See Section 510.4-1 and -2 for the maximum outflow rate from the detention basin. This will require the designer to calculate the pre and post development storage volumes (using the worksheets in D. above) for all storms (up to 100 year) of less frequency than the critical storm.

520.2 NRCS TR-20

Natural Resources Conservation Service Technical Release No. 20: Computer Program for Project Formulation Hydrology (NRCS TR-20) is a storm event surface water hydrologic model applied at a watershed scale. It computes direct runoff and develops hydrographs resulting from any synthetic or natural rainstorm. Multiple storms (rainfalls by frequency) can be analyzed within one model run. Developed hydrographs are routed through stream and valley reaches as well as through reservoirs to the watershed or reservoir outlet. A Windows based version of NRCS TR-20 was created in October 2004 and can be downloaded at no cost at the NRCS National Water and Climate Center web site. Support materials are also available on the web site, including the WinTR-20 user documentation and user guide, and a WinTR-20 tutorial.

520.3 The Rational Method

This method is limited to use for development sites or project areas that are fifty (50) acres or less in size under these regulations. The limitations of this method are similar to those stated in Section 520.1-3A.2(a) through 2(d) for the NRCS-T55 graphical peak flow determination. Use of this method for larger areas is acceptable upon approval by the CCBID.

520.3-1 Peak flow for the project area or development site has already been determined by the rational method in Section 510.3 in determination of the critical storm frequency. Offsite drainage areas tributary to the site shall be included in the design of storm sewers, culverts, ditches/swales, and other drainageways but are not required to be detained onsite. Theoretically, they are assumed to by-pass detention.

520.3-2 Storage Volume Design for Detention or Retention Basin
Appendix A - Exhibit III contains the worksheets required to calculate the storage volume needed when using the rational method.

A. $q_2 = A * C * i_2$

Where: q_2 = the peak flow rate due to a one (1) year frequency storm under pre development conditions.
A = the drainage area for the development
C = runoff coefficients for the predevelopment conditions
i_2 = rainfall intensity from Section 510.3 Table IV for a two year frequency storm

B. $Q_{cr} = A * C * i_{cr}$

Where: Q_{cr} = the maximum peak flow rate due to a critical storm frequency under post development conditions
A = the drainage area for the development
C = runoff coefficients for post development conditions
i_{cr} = the maximum rainfall intensity from Appendix A - Exhibit III for the critical storm frequency

C. The volume of storage calculated is that needed to reduce the critical storm peak flow rate under post development conditions to equal to or less than the two one (1) year pre development peak flow rate (q_2) found in step A. above.

D. The required volume of detention may also be determined from the criteria defined in Section 510.4-2.

520.4 The design methods mentioned above are recommended by the CCBID. This department also recognizes the availability of other design methods, such as the Hydrograph Method and the Storage Indication Method. In the interest of expedient processing of plans and construction, the use of the standard procedures, manuals, and computers programs is preferred.

520.4-1 **Determination of Water Quality Volume to be Treated**

For all construction activities that will disturb more than two acres of land or will disturb less than two acres, but is part of a larger common plan of development or sale which will disturb more than two acres of land, the post construction BMP(s) chosen must be able to manage storm water runoff for protection of stream channels, stream stability, and water quality. Structural (designed) post-construction storm water treatment practices shall be incorporated into the permanent drainage system for the site. The BMP(s) chosen must be sized to treat the water quality volume (WQ_v) and ensure compliance with Ohio's Water Quality Standards in OAC Chapter 3745-1. The WQ_v shall be equivalent to the volume of runoff from a 0.90-inch rainfall and shall be determined using one of the two following methods:

A. Through a site hydrologic study approved by the Building Inspection Department that uses continuous hydrologic simulation and local long-term hourly precipitation records; or,

B. Using the following equation:

$$WQ_v = Rv * P * A / 12 \qquad \text{(Equation 1)}$$

where: WQ_v = water quality volume in acre-feet
Rv = the volumetric runoff coefficient calculated using equation 2
P = 0.90 inch precipitation depth
A = area draining into the BMP in acres

$$Rv = 0.05 + 0.9i \qquad \text{(Equation 2)}$$

Where: i = fraction of post-construction impervious surface

An additional volume equal to 20 percent of the WQv shall be incorporated into the BMP for sediment storage. It is recommended that BMPs be designed according to the methodology described in the most current edition of the *Rainwater and Land Development* manual.

520.4-2 **Previously Developed Areas** - For a previously developed area, one of the following two conditions shall be met:

A. A 20 percent net reduction of the site's volumetric runoff coefficient through impervious area reduction with soil restoration, or replacing impervious roof area with green roof area (for these purposes green roofs shall be considered pervious surface), or

B. Treatment of 20 percent of the WQv for the previously developed area using a practice meeting Table V/VI criteria.

520.4-3 Where there is a combination of redeveloped areas and new development, a weighted approached shall be used with the following equation:

$$WQv = P * A * [(Rv1*0.2) + (Rv2 - Rv1)] / 12 \qquad \text{(Equation 3)}$$

Where: P = 0.90 inches
A = total site area (acres)
Rv1 = volumetric runoff coefficient for existing conditions (current site impervious area)
Rv2 = volumetric runoff coefficient for proposed conditions (post-construction site impervious area)

520.4-4 **Runoff Reduction Practices** - The size of structural post-construction practices used to capture and treat the WQv can be reduced by incorporating runoff reducing practices into the design of the site's drainage system. The approach to calculate and document runoff reduction is detailed in the *Rainwater and Land Development* manual. BMP-specific runoff reduction volumes are set by specifications in the *Rainwater and Land Development* manual for the following practices:

- Impervious surface disconnection
- Rainwater harvesting
- Bioretention
- Infiltration basin
- Infiltration trench
- Permeable pavement with infiltration
- Underground storage with infiltration
- Grass swale
- Sheet flow to filter strip
- Sheet flow to conservation area

SECTION 530 WMSC DESIGN REQUIREMENTS AND SPECIFICATIONS

530.1 Approved Post –Construction Best Management Practices

530.1.1 The BMPs listed in Table V and VI below are considered standard BMPs approved for general use. Post-construction practices shall be sized to treat 100% of the WQv associated with their contributing drainage area, and shall be designed such that the drain time is long enough to provide treatment, but short enough to provide storage for successive rainfall events and avoid the creation of nuisance conditions. The outlet structure for the post-construction BMP shall not discharge more than the first half of the WQv in less than one-third of the drain time. The WQv is the volume of storm water runoff that must be detained by a post-construction practice as specified by the most recent edition of the *Rainwater and Land Development* manual.

A regional storm water BMP may be used to meet the post-construction requirements if:

A. the BMP meets the design requirements for treating the WQv; and
B. a legal agreement is established through which the regional BMP owner or operator agrees to maintain the BMP in the long term in accordance with an approved Inspection and Maintenance Plan.

TABLE V. Extended Detention Post-Construction Practices with Minimum Drain Times

Extended Detention Practices	**Minimum Drain Time of WQ_v**
Retention (Wet Extended Detention) Basin[1, 2]	24 hours
Constructed Extended Detention Wetland[1, 2]	24 hours
Dry Extended Detention Basin[1, 3]	48 hours
Permeable Pavement - Extended Detention[1,4]	24 hours
Underground Storage – Extended Detention[1, 4]	24 hours
Sand & Other Media Filtration - Extended Detention[1, 5]	24 hours

Notes:
1. The outlet structure shall not discharge more than the first half of the WQv in less than one-third of the drain time.
2. Provide a permanent pool with a minimum volume equal to the WQv and an extended detention volume above the permanent pool equal to 1.0 x WQv.
3. Dry basins must include a forebay and a micropool each sized at a minimum of 0.1 x WQv and a protected outlet, or include acceptable pretreatment and an outlet protected from blockage by silt or debris.
4. Underground storage must have pretreatment for removal of suspended sediments included in the design and documented in the SWP3. This pretreatment shall concentrate sediment in a location where it can be readily removed. For non-infiltrating, underground extended detention systems, pretreatment BMPs certified to be 50% effective at capturing total suspended solids shall be considered suitable.
5. The WQv ponding area shall completely empty between 24 and 72 hours

TABLE VI. Infiltration Post-Construction Practices with Maximum Drain Times

Infiltration Practices	**Maximum Drain Time of WQ_v**
Bioretention Area/Cell[1, 2]	24 hours
Infiltration Basin[2]	24 hours
Infiltration Trench[2]	48 hours
Permeable Pavement - Infiltration[3]	48 hours
Underground Storage – Infiltration[3, 4]	48 hours

Notes:

1. Bioretention soil media shall have a permeability of approximately 1–4 in/hr. Meeting the soil media specifications in the *Rainwater and Land Development* manual is considered compliant with this requirement. Bioretention cells must have underdrains unless in-situ conditions allow for the WQv (surface ponding) plus the bioretention soil (to a depth of 24 inches) to drain completely within 48 hours.
2. Infiltrating practices with the WQv stored aboveground (bioretention, infiltration basin) shall fully drain the WQv within 24 hours to minimize nuisance effects of standing water and to promote vigorous communities of appropriate vegetation.
3. Subsurface practices designed to fully infiltrate the WQv (infiltration trench, permeable pavement with infiltration, underground storage with infiltration) shall empty within 48 hours to recover storage for subsequent storm events.
4. Underground storage systems with infiltration must have adequate pretreatment of suspended sediments included in the design and documented in the SWP3 in order to minimize clogging of the infiltrating surface. Pretreatment shall concentrate sediment in a location where it can be readily removed. For infiltrating underground systems, pretreatment shall be certified to be 80% effective at capturing total suspended solids.

The permittee may request BID to approve use of alternative structural post-construction BMPs if the permittee can demonstrate that the alternative BMPs are equivalent in effectiveness to those listed in Tables V and VI above. The permittee must also be able to demonstrate that Ohio EPA has approved use of the alternative BMPs.

530.2 Small Construction Activities

For all construction activities which result in a disturbance less than two acres, a post-construction practice shall be used to treat storm water runoff for pollutants and to reduce adverse impacts on receiving waters. If practices listed in Tables V and VI are not to be used, the applicant must provide a justification of why these practices are not feasible. The justification must address limiting factors which would prohibit the project going forward should these practices be required.

530.3 Detention/Retention Basins

530.3-1 Detention/Retention basins must be designed to limit the critical storm flow out of the basin to the one (1) year pre developed rate and, also have the capacity to store all storm frequencies greater that the critical value up to the 100 year storm under post developed conditions and release the outflows at the pre developed rate for like years. It is recommended that detention/retention basins be designed according to the methodology described in the most current edition of the *Rainwater and Land Development* manual.

530.3-2 The bottom of the basin should be constructed with slopes equal to or greater than 0.5% to facilitate interior drainage.

530.3-3 Steep slopes are to be avoided and seeding and other erosion control measures are to be used to protect the slopes. Side slopes should not be steeper than 3:1 or shallower than 12:1.

530.3-4 Paved/concrete gutters, channels and/or swales are not permitted.

530.3-5 The ratio of flow length to basin width should be at least 3:1 to avoid short circuiting and to increase travel time to the outlet. To increase a pond's flow length, the inlet or outlet may be re-located, or the contours of the pond may be configured to form baffles or an extended flow path.

530.3-6 Anti-seep collars or reinforced concrete pads placed under the discharge pipe(s) are to be used on all pipe outlets for retention basins and detention basins with wide berms when required. Show anti-seep collar spacing and details, and concrete pad details when required.

530.3-7 Spillway Design and Details

A. The spillway area (plan view), cross section detail, and other spillway details shall be located on the site plan or accompanying construction drawings.

B. All basins shall have emergency spillways that will safely pass the peak flow for a one hundred (100) year frequency storm under post development conditions at an acceptable velocity.

C. All outlet (release) structure details must be shown on the site plan or accompanying construction drawings. Include the following, but not limited to:

1. Pipe and orifice size(s)
2. Invert elevations
3. Provide weir length(s), type(s), and elevation(s)
4. Provide window sizes, elevations, and locations.

D. Provide spillway crest elevations and a minimum of one (1) foot freeboard.

E. Provide all inlet (outletting into basin) / outlet capacity and velocity calculations.

F. Since these WMSC Regulations require that the outflow rate from a detention or retention basin be held to a one (1) year pre development rate and the detention basin must also be designed to detain the expected runoff from a one hundred year post development condition, a two (2) stage orifice control may be required on most detention or retention basins.

G. A minimum depth of four (4) feet must be maintained in all retention basins to prevent stagnation of the pond.

H. Parking lot detention shall be kept a maximum depth of eight (8) inches and be located in primarily non-parking areas.

530.4 Underground Storm Water Management Systems

530.4-1 Underground storm water management systems that utilize extended detention to manage the WQv must be coupled with a pretreatment practice certified at a 50 percent total suspended solids (TSS) removal rate. Underground systems that utilize infiltration to manage the WQv must be coupled with a pretreatment practice certified at an 80 percent TSS removal rate.

530.4-2 Underground storm water management systems shall include a monitoring point to allow inspection without entry.

530.5 Onsite Storm Water Drainage Systems

530.5-1 Culverts

A. Culvert design review and field inspection under these regulations will be conducted by the Engineer's Office for those culverts located in the public right of way, and by CCBID for those located outside the public right-of-way.

B. Include backwater analysis, showing the flood elevation at a 100 year storm event. Drainage easements may be necessary if headwater encroaches adjoining property.

C. All culverts should be designed and constructed to adequately handle velocities and discharges for the following storm frequencies:

1. Twenty-five (25) year frequency storm under post development conditions for tributary drainage areas less than one hundred (100) acres.
2. Fifty (50) year frequency storm under post development conditions for tributary drainage areas greater than or equal to one hundred (100) acres.

D. Show calculations indicating if culvert flow is governed by inlet or outlet control.

E. Indicate volume and velocity of inflow and outflow from all culverts.

F. Provide rip-rap protection when required based on the chart provided in Appendix A, Exhibit III.

G. Provide overflow routing plan showing all areas downstream that would be affected by a blockage or storm in excess of design capacity.

530.5-2 Open Channels

A. Design by standard engineering practices with the storm frequencies required as shown in 530.5-1.C (1) and (2) above.

B. Indicate volume and velocity of outflow from the open channel. Provide for a 1.0 to 2.0 percent slope in the direction of flow, with 6.0 percent being the maximum and 0.5 percent the minimum.

1. When the longitudinal slope is less than 1.0 percent, install a low flow channel, or if moisture is adequate, establish wetland species.
2. If slope is greater than 2.0 percent, use check dams to reduce the effective slope to approximately 2.0 percent.
3. When the land slopes more than 6.0 percent, swales can be installed to traverse the grade at a lesser slope

530.5-3 **Headwalls**

Standard headwalls and/or wingwalls shall be constructed for all culvert inlets and outlets in swales and at the outfall of all storm sewers.

530.5-4 **Concentrated Flow to Wetlands**

Concentrated flow to natural wetlands shall be converted to diffuse flow before the runoff enters the wetlands. The flow should be released such that no erosion occurs downslope. If the applicant proposes to discharge to a natural wetland, a hydrologic analysis shall be performed. The applicant shall assess whether the construction activity will adversely impact the hydrologic flora and fauna of the wetland.

ARTICLE 6.0 EROSION AND SEDIMENT CONTROL MEASURES

SECTION 600 SCOPE

600.1 Effective erosion control planning requires a working knowledge of both the application of control measures in terms of their selection and location as well as the design and construction of the control measure. The purpose of this article of these regulations is to provide the engineer with a set of guidelines or minimum requirements that are to be used during the planning and installation of erosion and sediment control practices.

600.2 Every subdivision and non-farm commercial, industrial, and residential development shall require an erosion and sediment control system which is adequate to serve the development site or project area in order to protect the waters of the State and adjacent properties from pollution by sediment and soil erosion, and which meets the requirements of these regulations.

SECTION 610 GENERAL REQUIREMENTS

610.1 The erosion and sediment control system shall be designed such that during construction and after the development is completed, the sediment in the storm water runoff shall be trapped and held within the development or project area until disturbed or denuded areas have been stabilized.

610.1-1 The start of construction shall not begin until sufficient sediment control devices have been installed in a manner that will maintain the design intent and have been stabilized. Sediment basins and perimeter sediment barriers shall be implemented prior to grading and within seven days from the start of grubbing.

610.2 The development of an erosion and sediment control system consists of providing two (2) separate and distinct systems; the erosion control system and the sediment control system.

610.2-1 The erosion control system is installed to prevent the detachment of soil particles from the soil surface and to minimize soil particle movement into the storm water runoff system leaving the development or project area for the purpose of limiting the pollution of waters of the State and adjacent property.

610.2-2 The sediment control system is installed to prevent the conveyance or movement offsite of soil materials during earth disturbing activities and after construction of the project area is completed for the purpose of minimizing the pollution of waters of the State and adjacent property. All controls must be capable of ponding runoff to be considered functional.

610.3 To control sediment pollution in waters of the State caused by sloughing, landsliding, or dumping of earth material, or placing of earth material into such proximity that it may readily slough, slide, or erode into these waters by natural forces, no person(s) or entity(s) shall, unless in conformance with these regulations:

610.3-1 Dump or place earth material into waters of the State or in such proximity thereto that it may readily slough, slide, or erode into these waters unless such dumping or placing is authorized by the approving agency for purposes such as, but not limited to, constructing bridges, culverts, erosion control structures, and other in-stream or channel bank improvement work; or

610.3-2 Grade, excavate, fill or impose a load upon any soil or slope known to be prone to slipping or landsliding thereby causing it to become unstable unless qualified engineering assistance has been employed to explore slope stability problems and make recommendations to correct, eliminate, or adequately address the problems. Grading, filling, or construction shall commence only after the approving agency has reviewed and approved the recommendations in accordance with the requirements of these regulations.

SECTION 620 EROSION AND SEDIMENT CONTROL PLAN CRITERIA

620.1 **Stabilization of Denuded Areas and Soil Stockpiles:** Stabilization of disturbed areas shall, at a minimum, be initiated in accordance with the time frames specified below

620.1-1 **Permanent Stabilization**

A. Any areas that will lie dormant for one year or more must be permanently stabilized within seven days of the most recent disturbance
B. Any areas within 50 feet of a surface water of the state and at final grade must be permanently stabilized within two days of reaching final grade
C. Other areas at final grade must be permanently stabilized within seven days of reaching final grade in that area.
D. Permanent vegetation shall not considered to be adequate until the ground cover established can prevent or control erosion.

620.1-2 **Temporary Stabilization**

A. Any disturbed areas within 50 feet of a surface water of the state and not at final grade must be stabilized within two days of the most recent disturbance if the area will remain idle for more than 14 days.

B. Any disturbed area that will be dormant for more than 14 days but less than one year, and not within 50 feet of a surface water of the state, must be stabilized within seven days of the most recent disturbance. For residential subdivisions, disturbed areas must be stabilized at least seven days prior to transfer of permit coverage for the individual lot.
C. Disturbed areas that will be idle over the winter must be stabilized prior to the onset of winter weather.

620.1-3 Soil stockpiles must be stabilized and protected with sediment trapping to prevent soil loss.

620.1-4 **Watercourses during construction**:

A. When a watercourse must be crossed regularly during construction, a temporary stream crossing shall be provided, and an approval obtained from CCBID. It is recommended that temporary stream crossings be designed according to the methodology described in the current edition of the Rainwater and Land Development manual.
B. When constructing stream utility crossings for pipelines, power lines or roads and bridges, measures must be taken to minimize damage to the watercourse. It is recommended that the specifications for stream utility crossings in the current edition of the Rainwater and Land Development manual be followed.
C. When in-channel work is conducted, the channel shall be stabilized before, during and after work.
D. Stabilization adequate to prevent erosion must be provided at the outlets of all pipes and paved channels.
E. Measures taken to stabilize channels and outfalls may include seeding, dormant seeding, mulching, erosion control matting, sodding, riprap, rock check dams or natural channel design with bioengineering techniques.

620.2 **Protection of Adjacent Properties**

620.2-1 Waters of the State and properties adjacent to the site of earth disturbing activities shall be protected from sediment deposits through the use of buffer strips, sediment barriers, filters or dikes, sediment basins, or any combination of these or similar measures.

620.2-2 If vegetative buffers are to be used as part of the sediment control plan to protect waters of the State, they should only be used on development sites or project areas where only sheet flow runoff is expected. The recommended undisturbed buffer along a surface water of the State is a minimum of 50 feet as measured from the ordinary high water mark of the surface water.

620.2-3 If vegetative buffers are to be used as part of the sediment control plan to protect properties adjacent to the site, they should only be used on development sites or project areas where only sheet flow runoff is expected. Also, the buffer strips shall be a minimum of fifteen (15) feet in width.

620.3 Timing and Stabilization of Sediment Trapping and Erosion Control Measures

620.3-1 Sediment and erosion control measures intended to trap and retain sediment onsite shall be constructed as a first step in earth disturbing activities. These measures shall be fully functional before any additional earth disturbances take place. These measures shall be maintained in functional condition until full stabilization of the earth disturbing activities has been completed.

620.3-2 Earthen sediment and erosion control structures must be stabilized (vegetative cover) within seven (7) days of installation.

620.4 Cut and Fill Slopes

Cut and fill slopes must be designed and constructed in a manner which will minimize erosion. Consideration must be given to the length and steepness of the slope, soil type, upslope drainage, subsurface conditions, and other applicable factors. Special consideration shall be given for the following conditions:

A. If any newly constructed slope meets or exceeds a horizontal to vertical ratio of 3:1.
B. Or, if any fill will be placed on an existing slope that meets or exceeds a horizontal to vertical ratio of 5:1.

Otherwise, adequate and appropriate slope stabilization measures shall be provided for all cut and fill areas.

620.5 Storm Sewer Inlet Protection

All storm sewer inlets which are made operable during construction should be protected so that sediment-laden storm water will not enter the storm water conveyance system without first being filtered to remove sediment. **Exception:** Storm water inlets that are designed as a part of the sediment control system or that outlet into a sediment control system.

620.6 Disposal of Temporary Erosion and Sediment Control Measures

620.6-1 All temporary erosion and sediment control measures shall be removed within thirty (30) days after final site stabilization is achieved as determined by the CCBID or after temporary measures are no longer required as authorized by the CCBID.

620.6-2 Trapped sediment and other disturbed soil areas resulting from disposition of temporary measures shall be permanently stabilized to prevent further erosion and sedimentation.

SECTION 630 EROSION AND SEDIMENT CONTROL DESIGN STANDARDS

630.1 Scope

The SWP3 shall contain detail drawings for all structural practices. The most recent version of Ohio's *Rainwater and Land Development* manual will be used as a reference for all design criteria, procedures, policy, statements, and sample calculations shall be the basis for design, construction, and implementation of all sediment and erosion control systems, unless otherwise given or noted in these regulations.

630.2 Soil Stabilization Measures

630.2-1 Critical Area Planting or Seeding

When planting or seeding critical areas, specifications for temporary seeding, permanent seeding and mulching as contained in the most recent version of Ohio's *Rainwater and Land Development* manual shall be used.

630.2-2 Outlet Protection

Velocity dissipation devices (e.g., rock outlet protection, rock-lined channels, level spreaders) shall be placed at discharge locations and along the length of any outfall channel to provide non-erosive flow velocity from the structure to a watercourse, in accordance with specifications contained in the most recent version of Ohio's *Rainwater and Land Development* manual.

630.3 Runoff Control Measures

The WMSC Plan shall incorporate measures which control the flow of runoff from disturbed areas so as to prevent erosion from occurring. Such practices may include rock check dams, pipe slope drains, diversions to direct flow away from exposed soils, and protective grading practices.

These practices shall divert runoff away from disturbed areas and steep slopes where practicable.

630.3-1 Natural or constructed onsite storm water open-channel conveyance systems shall be designed to carry the peak rate of runoff as defined in Section 530.3-2.

630.3-2 The design and necessity of other runoff control measures such as diversions and subsurface drainage, will be left to the discretion of the engineer subject to approval by the CCBID.

630.4 **Sediment Control Measures:** The WMSC Plan shall include a description of structural practices that shall store runoff allowing sediments to settle and/or divert flows away from exposed soils, or otherwise limit runoff from exposed areas. Structural practices shall be used to control erosion and trap sediment from a site remaining disturbed for more than 14 days. All sediment control practices must be capable of ponding runoff in order to be considered functional. No structural controls shall be used in a surface water of the state.

630.4-1 **Sediment settling ponds:** A sediment settling pond is required for any one of the following conditions:

A. concentrated flow (e.g., storm sewer or ditch);
B. runoff from drainage areas, which exceed the design capacity of silt fence or other sediment barriers; or
C. runoff from drainage areas that exceed the design capacity of inlet protection. All inlets receiving runoff from drainage areas of one or more acres require a sediment settling pond.

The permittee may request approval from the CCBID if it can demonstrate that alternative controls are equivalent in effectiveness to a sediment settling pond.

The sediment settling pond shall provide a dewatering zone of at least 1800 ft^3 per acre of drainage (67 yd^3 per acre) with a minimum drain time of 48 hours. The sediment storage zone shall either be 1000 cubic feet per disturbed acre within the watershed of the basin or shall be the volume necessary to store the sediment as calculated with Revised Universal Soil Loss Equation (RUSLE) or similar generally accepted erosion prediction model. When determining the total contributing drainage area, off-site areas and areas which remain undisturbed by construction activity must be included, unless runoff from these areas is diverted away from the sediment settling pond and is not co-mingled with sediment laden runoff.

The accumulated sediment shall be removed from the sediment storage zone once it exceeds 50 percent of the minimum required sediment storage design capacity, and prior to the conversion to the post-construction practice unless suitable storage is demonstrated based on over-design. The depth of the dewatering zone shall be less than or equal to five feet.

If feasible, sediment settling ponds shall be dewatered at the pond surface using a skimmer or equivalent device.

The configuration between inlets and the outlet of the basin must provide at least two units of length for each one unit of width.

630.4-2 **Silt Fences and Sediment Barriers**

Silt fences are limited to sheet or overland flow. Where intended to provide sediment control, silt fence shall be placed on a level contour downslope of the disturbed area. For most applications, standard silt fence may be substituted with a 12-inch diameter sediment barrier. The relationship between the maximum drainage area to sediment barrier for a particular slope range is shown in the table below:

Maximum drainage area (in acres) to 100 linear feet of sediment barrier.	Range of slope for a particular drainage area (in percent)
0.5	< 2%
0.25	≥ 2% but < 20%
0.125	≥ 20% but < 50%

630.4-3 No solid (other than sediment) or liquid waste, including building materials, shall be discharged in storm water runoff. All necessary best management practices must be implemented to prevent the discharge of non-sediment pollutants to the drainage system of the site. Under no circumstance shall concrete trucks wash out directly into a drainage channel, storm sewer or other watercourse.

630.4-4 To meet the post-construction requirements of this permit, the WMSC plan must contain a description of the post-construction BMPs that will be installed during construction for the site and the rationale for their selection. Permittees are responsible for assuring all post-construction practices meet plan specifications and intended post-construction conditions have been met (e.g. sediment removed from and sediment storage restored to, permanent pools, sediment control outlets removed and replaced with permanent post-construction discharge structures, and all slopes and drainageways permanently stabilized), but are not responsible for maintenance after storm water discharges associated with construction activity have been eliminated from the site.

SECTION 640 EROSION AND SEDIMENT CONTROL INSPECTION REQUIREMENTS

640.1 The permittee shall assign "qualified inspection personnel" to conduct inspections to ensure that the control practices are functional and to evaluate whether current controls are adequate or whether additional control measures are required. At a minimum, procedures in a SWP3 shall provide that all controls on the site are inspected:

A. after any storm event greater than one-half inch of rain per 24-hour period by the end of the next calendar day, excluding weekends and holidays unless work is scheduled; and
B. once every seven calendar days.

The inspection frequency may be reduced to at least once every month for dormant sites if:

A. the entire site is temporarily stabilized, or
B. runoff is unlikely due to weather conditions for extended periods of time (e.g., site is covered with snow, ice, or the ground is frozen).

The beginning and ending dates of any reduced inspection frequency shall be documented in the SWP3. Once a definable area has been finally stabilized, the area may be marked on the SWP3 and no further inspection requirements shall apply to that portion of the site.

640.2 Following each inspection, a checklist must be completed and signed by the qualified inspection personnel representative. At a minimum, the inspection report shall include:

A. the inspection date;
B. names of personnel making the inspection
C. weather information for the period since the last inspection (or since the commencement of construction activity if the first inspection), including a best estimate of the beginning, duration and amount of rainfall for each storm event, and whether any discharges occurred;
D. weather information and a description of any discharges occurring at the time of the inspection;
E. location(s) of discharges of sediment or other pollutants from the site
F. location(s) of BMPs that need to be maintained;
G. location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
H. location(s) where additional BMPs are needed; and
I. corrective action required including any changes to the WMSC Plan necessary and implementation dates.

640.3 Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of or the potential for pollutants entering the drainage system. Erosion and sediment control measures identified in the WMSC Plan shall be observed to ensure that they are operating correctly. Discharge locations shall be inspected to ascertain whether erosion and sediment control measures are effective in preventing significant impacts to the receiving waters. Locations where vehicles enter and exit the site shall be inspected for evidence of off-site vehicle tracking.

SECTION 650 EROSION AND SEDIMENT CONTROL MAINTENANCE REQUIREMENTS

650.1 **When practices require repair or maintenance:** If an inspection reveals that a control practice is in need of repair or maintenance, with the exception of a sediment settling pond, it shall be repaired or maintained within three (3) days of the inspection. Sediment settling ponds shall be repaired or maintained within ten (10) days of the inspection.

650.2 **When practices fail to provide their intended function:** If the inspection reveals that a control practice fails to perform its intended function, and that another, more appropriate control practice is required, the WMSC Plan shall be amended and the new control practice shall be installed within ten (10) days of the inspection.

650.3 **When practices depicted on the WMSC Plan are not installed:** If the inspection reveals that a control practice identified in the WMSC plan has not been implemented, the control practice shall be implemented within 10 days from the date of the inspection. If the inspection reveals that the planned control practice is not needed, the record shall contain a statement of explanation as to why it is not needed.

650.4 Maintenance and repair of all temporary and permanent erosion and sediment control practices and or facilities as needed to assure continued performance of intended function shall be the responsibility of the developer and/or owner(s) until the development or project area is approved by the CCBID and the development or project area is stabilized with all permanent cover to prevent erosion.

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ARTICLE 7.0 EASEMENTS, BONDS AND MAINTENANCE

SECTION 700 EASEMENTS

700.1 Drainage easements shall be provided for all storm water conveyance systems, detention/retention structures, and drainage swales between lots, and shown on the final construction drawings and the record plat.

700.2 Drainage Easement Requirements

700.2-1 All drainage easements shall be of sufficient area to contain the facility plus allow adequate space for maintenance and repair operations. The drainage easement boundaries shall be determined by the design engineer and accepted following approval by the Clermont County Planning Commission, Clermont County Engineer's Office and the CCBID. However, the following constraints are the acceptable minimums required:

A. A minimum drainage easement width equal to ten (10) feet for all storm water conveyance systems.

B. The minimum easement for all detention or retention basins shall be the area defined by the one hundred (100) year storm elevation.

C. An easement for ingress and egress must be provided to the entity responsible for the maintenance of the facility between the public right of way and any drainage facility requiring maintenance. The easement must also include the structure or drainage feature requiring maintenance. The easement shall be of adequate width to perform any required maintenance but not less than twenty (20) feet.

D. The maximum slope for any vehicle access way shall be 6 (H) to 1 (v), unless the long term management plan approved by CCBID demonstrates that a steeper slope is appropriate for the planned management activities

700.2-2 All drainage easements shall be located and labeled on the development (construction) drawings and the record plat(s) by a metes and bounds description

700.2-3 No structures or facilities shall be permitted within the drainage easement that obstruct the drainage system, except those pertaining to the function of the WMSC facility.

700.2-4 Planting and seeding for detention basins and other WMSC facilities shall be limited to the critical area planting defined in Sections 210 and 630.2.

SECTION 710 BASIN AS-BUILT CERTIFICATION

Detention/Retention Basin As-Built Certification, including a Survey, must be sealed, signed and dated by a Professional Engineer and a Professional Surveyor. The As-Built Certification shall certify that the facilities have been constructed in accordance with the approved plans.

The surveyor shall complete a field survey of the detention/retention facilities to verify as-built elevations and dimensions. The as-built drawing and as-built information of the detention/retention facilities shall include, but not limited to, the following:

A. Storage capacity
B. Basin side slopes (i.e. 4:1)
C. Elevations and dimensions of the primary hydraulic control structure
D. Elevations and dimensions of the emergency spillway; freeboard
E. As-built release rates for each design storm
F. As-built water surface elevations for each design storm.

The as-built drawing shall include both the design value (crossed-out) and the as-built value. The as-built drawing shall be signed and sealed by the engineer and surveyor. The following statement shall be placed on the as-built drawings: "I certify an as-built survey has been conducted for the subject storm water management facility. The facility is expected to perform as noted hereon." The Record Plat will not be signed nor will a Certificate of Occupancy be issued until the certification is submitted and approved by the CCBID.

SECTION 720 PERFORMANCE/MAINTENANCE SURETY OR BOND

720.1 All water management and sediment control facilities that are directly related to the drainage of or from the roads, streets, alleys, ditches, sidewalks, or other such improvements located in a private development, in an unincorporated area of Clermont County, shall be included in the Performance/Maintenance Surety (bond) as required by the Clermont County Engineer.

720.2 A Performance/Maintenance Surety Bond of 130% (amount to be approved by the CCBID) will be required for work covered by the Water Management and Sediment Control Regulations before the record plat can be recorded for any subdivision and prior to the release of any permit or partial permit by the CCBID. The bond is to remain in effect until the project is complete and the final approval is made.

720.3 Periodic inspections by the CCBID or authorized representative will be required throughout the project to assure the site remains in compliance with these regulations.

720.4 If inspections reveal the construction activities are not in compliance with these regulations, the Performance Maintenance Bond may be forfeited to achieve such compliance.

720.5 The bond is to remain in effect until all inspections of the site are completed and the basin verification has been submitted to and approved by the CCBID.

SECTION 730 MAINTENANCE

730.1 The owner or developer shall maintain all WMSC facilities constructed and/or installed under the WMSC Permit. All WMSC facilities shall be maintained in designed working condition to meet the design standards and the requirements of these regulations. Failure to maintain the improvement or facility could result in action against both the surety and the owner/developer.

730.2 The maintenance responsibility stated in Section 730.1 shall be recorded on the deed for the property and on the record plat. Also, reference is to be made to the entity or individual(s) to be responsible for the maintenance.

730.3 Upon expiration of the Performance/Maintenance Surety Bond, the maintenance responsibility for the WMSC facilities contained within designated drainage easements shall revert to the individual(s) or group(s) of property owners as identified on the record plat.

730.4 Post-Construction Inspection and Maintenance (I&M) Plans, including detailed drawings of the management practice, must be provided for all post-construction BMPs. A draft I&M plan shall be submitted to CCBID for review and approval with the as-built certifications described in Section 710 I&M plans must include at a minimum:

A. the name and contact information for the entity owns each post-construction management practice, and the entity responsible for providing post-construction operation, inspection and maintenance,
B. routine and non-routine maintenance tasks that should be undertaken,
C. a schedule for inspection and maintenance,
D. any necessary legally binding maintenance easements and agreements
E. Construction drawings or excerpts showing the plan view, profile and details of the BMP
F. a map showing all access and maintenance easements.

G. Relevant elevations and associated volumes that dictate when removal of accumulated sediment must occur.
H. A prohibition on alteration of the post-construction management practice without prior written approval from the CCBID.

Once approved by CCBID, a final copy of the I&M Plan must be provided to the post-construction operator. CCBID shall maintain copies of all approved I&M Plans.

Permittees are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site and are not responsible for maintenance after storm water discharges associated with construction activity have been eliminated from the site.

730.5 Petitions for Permanent Maintenance of WMSC Facilities

730.5-1 Applicants may submit a petition for permanent maintenance of WMSC facilities under Ohio Revised Code Chapter 6131. The petition shall be submitted to the CCBID and the Clermont County Engineer's Office at the preliminary design stage.

730.5-2 Applicants may also petition the Board of County Commissioners to establish a storm sewer district under Ohio Revised Code Chapter 6117 for the *permanent* maintenance of WMSC facilities.

730.6 Post Construction Inspections and Maintenance

730.6-1 Post construction best management practices shall be owned, controlled and maintained by a Legal Entity as follows:

A. If the post-construction BMP serves a single property, then the property owner shall be the Legal Entity.

B. If the post-construction BMP serves multiple lots in residential, commercial, industrial and/or condominium developments, then the BMP shall be on a separate lot or located within an easement as specified in these regulations. The Legal Entity shall be one of the following:

1. a validly created owners association under Ohio law,
2. a local unit of government, or
3. a property owner with a valid contract with the property owners served by the post-construction BMP.

C. In the event the relationship between the Legal Entity and the property owners is dissolved, or if the Legal Entity fails to perform required maintenance, responsibility for such maintenance shall be proportionally distributed to each property owner contributing storm water to the post-construction BMP.

730.6-2 The Legal Entity defined in Section 730.6-1 shall either serve as or contract with a Maintenance Provider who shall be responsible for managing the post-construction BMPs. The Maintenance Provider shall maintain the BMPs in accordance with the I&M Plan and in good working condition so that the system of BMPs is performing its design functions

730.6.3 Any changes in the I&M Plan must be approved in advance by the CCBID and recorded in the same manner as the original I&M plan prior to becoming effective. The CCBID shall be notified in writing immediately whenever a new maintenance provider is designated.

730.6-4 An Enforcing Official bearing proper credentials and identification shall be permitted at all reasonable times to enter upon any property or to gain access to any easements as necessary to inspect, observe, maintain, and repair the system of post-construction BMPs whenever the official deems necessary. When practical, the Enforcing Official shall provide written notice to the Legal Entity, property owners and Maintenance Provider prior to entry. Any obstruction preventing safe and easy access to the system of BMPs shall be promptly removed or cleared upon request of the Enforcing Official.

730.6-5 The Enforcing Official may inspect post-construction BMPs periodically and determine if maintenance is required according to criteria in the I&M Plan or design drawings. If the Enforcing Official identifies a maintenance need, the Official will provide written notification to the Legal Entity. Upon notification, the Legal Entity shall have thirty (30) working days to make repairs or submit a plan for approval to the Enforcing Official with details regarding the necessary repairs, action items and established timelines.

730.6-6 If the Legal Entity and/or designated Maintenance Provider fails to maintain a Post-Construction BMP, the Enforcing Official may enter the property, perform the required maintenance, and bill the Legal Entity or Maintenance Provider, or, in the event there is no currently viable Legal Entity or Maintenance Provider, the property owners contributing storm water to the BMP, for such costs. Neither the CCBID or other Enforcing Official shall be under any obligation to maintain or repair the system of post-construction BMPs, and in no event shall these regulations be construed to impose any such obligations upon these entities.

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ARTICLE 8.0 RULES AND REGULATIONS REGARDING ILLICIT DISCHARGES AND ILLEGAL CONNECTIONS TO THE SEPARATE STORM SEWER SYSTEM

SECTION 800 SCOPE

The rules and regulations regarding illegal discharges and illicit connections to the Clermont County Separate Storm Sewer System (CCS4) are enacted pursuant to ORC Section 6117.01. The purpose of the regulations contained herein is to reduce to the maximum extent practicable the introduction of pollutants into to the CCS4 in order to protect the health, safety, and welfare of the citizens of Clermont County and to comply with requirements of Ohio EPA's National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges.

800.1 Objectives

The objectives of these regulations are:

A. To regulate the contribution of pollutants to the CCS4 by any person;
B. To prohibit illicit discharges and illegal connections to the CCS4;
C. To prevent non-storm water discharges, generated as a result of spills, inappropriate dumping or disposal, to the CCS4.
D. To establish the legal authority to ensure compliance with the provisions of these regulations through the inspection, monitoring, and enforcement procedures described herein.

800.2 Applicability

These regulations shall apply to all substances entering or likely to enter the CCS4 which are generated on any premises within Clermont County unless explicitly exempted by the Enforcing Official or allowable under a NPDES Storm Water Discharge Permit.

800.3 Compatibility with Other Regulations

These regulations are not intended to modify or repeal any other regulation, rule, or other provision of law. The requirements of these regulations are in addition to the requirements of any other regulation, rule, or other provision of law, and where any provision of these regulations imposes restrictions different from those imposed by any other regulation, rule, or other provision of law, whichever provision is more restrictive or imposes higher protective standards for human health or the environment shall control.

SECTION 810 DISCHARGE PROHIBITIONS AND EXEMPTIONS

810.1 Prohibition of Illegal Discharges

810.1-1 No person shall discharge or cause to be discharged into any portion of the CCS4 any pollutants, contaminants, or waters containing any pollutants or contaminants other than storm water that cause or contribute to a violation of these regulations or the NPDES Storm Water Discharge Permit.

810.1-2 No person shall connect or cause to be connected any pipe, ditch or other outlet or accessory to any portion of the CCS4 which conveys or discharges any pollutants, contaminants or substances other than storm water into the CCS4 without written permission from the Enforcing Official. The un-permitted construction, use, maintenance or continued existence of such a connection is prohibited. This prohibition expressly includes, without limitation, connections made prior to the effective date of these Regulations and for which the Enforcing Official has not issued a valid and binding permit, regardless of whether the connection was previously permissible under the law or practices applicable or prevailing at the time of connection.

810.2 Exemptions to Illegal Discharges

810.2-1 The following non-storm water discharges are not considered illicit discharges and are exempt from discharge prohibitions established by these regulations:

A. water line flushing or other potable water sources,
B. landscape irrigation or lawn watering,
C. diverted stream flows,
D. rising ground water,
E. ground water infiltration to storm drains,
F. uncontaminated pumped ground water,
G. foundation or footing drains (not including active groundwater dewatering systems),
H. crawl space pumps,
I. air conditioning condensation,
J. springs,
K. non-commercial washing of vehicles,
L. natural riparian habitat or wetland flows,
M. residential swimming pools with pH levels between 6.5 and 8.5,
N. fire fighting activities,
O. street wash water
P. any other water source not containing pollutants

Q. Discharges specified in writing by the Enforcing Official as being necessary to protect public health and safety.

810.2-2 Dye testing is an allowable discharge, but requires a verbal notification to the Enforcing Official prior to the time of the test.

810.2-3 The prohibition shall not apply to any non-storm water discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Ohio or U.S. Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.

810.3 Home Sewage Treatment Systems

Discharges from home sewage treatment systems into the CCS4 must meet the regulatory requirements under Ohio Administrative Code Section 3701-29-01 or other applicable regulatory requirements. Home sewage treatment systems which have off-lot discharges must also be designed, sited and maintained in a manner consistent with Ohio Administrative Code Section 3701-29-01 or other applicable regulatory requirements. Discharges into the CCS4 from home sewage treatment systems not maintained in accordance with these regulatory requirements are not permitted under any circumstances.

810.4 Underground Storage Tanks

In conjunction with the repair, remediation or removal of underground storage tanks, groundwater can not be discharged to the CCS4 unless pollutant concentrations meet or exceed criteria set forth by the Ohio Environmental Protection Agency. If pollutant concentrations exceed these criteria, the groundwater must either be:

A. discharged to a sanitary sewer system with the approval of the entity that operates the system,
B. hauled to a wastewater treatment plant for disposal, or
C. provided pre-treatment to reduce pollutant concentrations to levels that meet Ohio Environmental Protection Agency criteria.

810.5 Salt Storage

Designated salt storage areas at commercial, institutional and non-NPDES permitted industrial facilities shall be covered or indoors, and located on an impervious surface. These facilities must implement management practices to reduce the exposure of salt to precipitation when transferring material in designated salt storage areas (e.g., sweeping, diversions and/or containment).

810.6 Watercourse Protection

Every person owning property through which a watercourse serving the CCS4 passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris, yard waste, excessive vegetation, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

SECTION 820 MONITORING OF DISCHARGES

820.1 Access and Inspection of Properties and Facilities

A. The Enforcing Official shall be permitted to enter and inspect premises subject to supervision under these regulations as often as may be necessary to determine compliance with these regulations. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to representatives of the Enforcing Official.

B. Facility operators shall allow the Enforcing Official ready access without unreasonable delays to all parts of the premises for the purposes of inspection, sampling, examination and copying of records that must be kept under the conditions of an NPDES storm water discharge permit, and the performance of any additional duties as defined by state and federal law.

C. The Enforcing Official has the right to require the discharger to allow the installation of monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure storm water flow and quality shall be calibrated to ensure their accuracy. These calibration records will be kept on hand and made readily available at all times.

SECTION 830 NOTIFICATION OF ACCIDENTAL DISCHARGES AND SPILLS

830.1 As soon as any person responsible for a premises, or responsible for emergency response to a premise has knowledge or information of an un-permitted discharge from such premises into the CCS4 which does not involve hazardous materials, said person shall promptly notify the Enforcing Official and shall take all reasonable steps to ensure the expedient containment and cleanup of such discharges, protect the health and safety of the public and mitigate damage to the environment. Where an un-permitted discharge or threatened discharge involves the release of hazardous materials, said responsible person shall, in addition to the above actions, immediately notify the appropriate emergency response agencies.

830.2 In the case of an un-permitted discharge which involves the release of non-hazardous materials, "prompt notification" shall mean notification to the Enforcing Official by phone, e-mail or facsimile as expeditiously as possible, but not later than the next business day. In all cases involving un-permitted discharges, notification in person, by phone, or e-mail shall be confirmed by written notice addressed and mailed to the Enforcing Official within three (3) working days of the phone, or e-mail notice.

830.3 Where an un-permitted discharge or threatened discharge involves the release of materials from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to mitigate the effects of such release and to prevent its recurrence. Such records shall be retained for a period of not less than five years from the time of the incident.

SECTION 840 USE OF BEST MANAGEMENT PRACTICES TO ELIMINATE ILLICIT DISCHARGES

840.1 The person responsible for a premise which is, or may be, the source of an illicit discharge or illegal connection, may be required to implement, at said person's expense, additional structural and non-structural Best Management Practices (BMPs) to prevent the further discharge of pollutants to the CCS4. Compliance with all terms and conditions of a valid NPDES storm water discharge permit associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of these regulations. These BMPs shall be part of a Storm Water Pollution Prevention Plan as necessary for compliance with requirements of the NPDES permit.

SECTION 850 ENFORCEMENT

850.1 Notification of Violation

850.1-1 Whenever the Enforcing Official finds that a person has failed to meet a requirement hereof, the Enforcing Official may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:

A. The performance of monitoring, analyses, and reporting;
B. The elimination of illicit connections or discharges;
C. That violating discharges, practices, or operations shall cease and desist;
D. The abatement or remediation of illicit discharge or contamination hazards and the restoration of any affected property; and
E. The implementation of control measures required by the Enforcing Official.

850.1-2 The requirement to implement such measures may be in addition to and not in lieu of any prosecution for fines or other remedies as may be available to the Enforcing Official under applicable law.

850.1-3 If abatement of a violation or restoration of affected property is required as a result of an un-permitted discharge, the notice of violation shall set forth a deadline within which such remediation or restoration must be completed based on the scope of the problem that requires correction. The notice may further provide that, should the violator fail to remediate or restore within the established deadline, the enforcing agency may seek to recover all remediation costs from the violator in addition to any civil and/or criminal penalties as may be recoverable under applicable laws.

850.2 Appeal of Notice of Violation

Any person receiving a Notice of Violation may appeal the determination of the Enforcing Official to the Clermont County Board of Appeals. The notice of appeal must be in writing and received within ten (10) working days from the date of mailing of the Notice of Violation. The Board of Appeals shall set a date for a public hearing upon receiving the appeal request form the applicant and shall arrive at a decision no more than fifteen (15) days after the hearing. Appeals from the decision made by the Board of Appeals may be taken to the Clermont County Court of Common Pleas.

850.3 INJUNCTIVE RELIEF

It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of these Rules and Regulations. In addition to seeking civil penalties for any such violation(s), the Enforcing Official may petition the appropriate court for injunctive relief to restrain continuing or threatened future violations and/or to compel the abatement of the activities leading to any violation or threatened violation, or the remediation of the effects of any violation.

850.4 VIOLATIONS A PUBLIC NUISANCE

A condition caused or permitted to exist as a result of any violation of Article 330.0 of the Clermont County Water Management and Sediment Control Regulations which threatens the public health, safety, or welfare constitutes a public nuisance subject to abatement, restoration and/or civil action to abate or enjoin as may be available under applicable law.

850.5 REMEDIES NOT EXCLUSIVE

The remedies provided in Article 330.1.2 of the Clermont County Water Management and Sediment Control Regulations shall not be exclusive of any other remedies available under any applicable federal, state or local law, and it is within the discretion of the Enforcing Official to seek cumulative remedies.

APPENDIX B

Village of Mt Orab

Utility Department

(Water and Sanitary Sewer)

Regulations and

Standard Drawings

Acknowledgements and Intent:

The Village of Mount Orab would like to thank the Clermont County Building Inspection Department (CCBID), Clermont County Engineer, Clermont County Water Resources Department, Clermont County Board of Commissioners, and the City of Milford, Ohio for allowing the Village of Mt Orab utilization of the Clermont and Milford Fire Department Regulations and Standards.

The intent of these regulations is to provide the developers, construction professionals, building professionals, citizens, and all other users with similar regulations for the region. Many differences are historical.

Notice: Some Mount Orab regulations are unique to the Village. Sections of the regulations that differ from Clermont County Regulations are clearly marked.

These utility regulations and standard drawings are based on the Clermont County Water & Sewer Regulations generally dated 06-01-2022.

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SECTION 1010 – GENERAL SCOPE AND SPECIAL PROVISIONS

PART 1 – GENERAL

1.1 SCOPE OF WORK

The work under this contract includes all necessary equipment, materials, testing, and incidental items and labor as required to construct the improvements and all appurtenances as shown on the Construction Drawings.

It is the intent of these construction specifications to describe a complete functioning system in all respects, whether or not every sub-element of the total system is actually defined in writing and/or detail. Payment to the Contractor(s) shall be inferred to cover work and materials required for a complete functioning system or complete element within the system, such that when final payment is made, the system is completely operable and functions in all respects as required by the Contract Documents.

Where the word “Engineer” is referenced in these specifications, it shall also mean the Owner or Owner’s Representative.

1.2 EXISTING SEWERS, MAINTENANCE OF FLOW

Flows in existing sewers shall not be disrupted due to construction related to this project. Existing flows (including those caused by rain events) shall be maintained by pumping (or some other approved method) around the construction area. Adequate sizing of the temporary pumps required to convey the existing flows is the responsibility of the Contractor. Any temporary pumping required for satisfactory construction of this project shall come at no additional expense to the Owner.

1.3 YARD RESTORATION (SEEDING AND MULCHING)

The Contractor shall restore all areas disturbed as a result of construction as a minimum to the original grade of the area prior to construction and to the satisfaction of the Owner's Representative. All trench backfill must be mechanically compacted to eliminate settlement. All debris (including rock, tree branches, and scrap materials) shall be removed from the site as ordered by the owner throughout the duration of the project. Seeding and mulching **is** in the scope of this project. The Contractor must ensure that all disturbed surfaces are sufficiently restored to allow for seeding and mulching (including final grading, backfill compaction, and rock and debris removal). The Contractor’s restoration duties shall be performed at the discretion of the Owner’s Representative and shall not be delayed until such time that it can be performed on a project wide basis. This work shall be accomplished as soon as finished grade can be accomplished on any significant portion of the project, as determined by the Owner’s Representative.

1.4 STAINLESS STEEL

Unless otherwise noted, stainless steel shall be taken to mean 300 series stainless steel. For all types of stainless steel the contractor furnishing stainless steel components is responsible for ensuring the corrosion resistance of those components, as installed, repairing/replacing any defective components at his cost. Care must be exercised during fabrication and installation, particularly while welding, to ensure corrosion resistant properties remain intact.

1.5 REFERENCE TO OTHER DOCUMENTS, SPECIFICATIONS, ETC. AND PAYMENT RELATIVE THERETO

Throughout the specifications, reference is made to other specification documents (i.e. ODOT Specifications). Payment for items, including those referencing other specification documents, shall be made at the Quantities and Unit Prices established by the Village of Mt. Orab Utility Department Specifications ONLY. Units, quantities, indices, and asphalt binder price adjustments established by referenced specifications are not to be used to establish payment or adjust unit prices.

1.6 PRECONSTRUCTION VIDEO AND STILL PHOTOGRAPHY

Prior to mobilization of any equipment or commencement of construction, the Contractor shall prepare a preconstruction video and still photography performed regularly during the course of the work.

The purpose of the video inspection is to provide a reliable basis for restoring surface features affected by the work. Video inspection shall cover the entire project area to facilitate restoration to original condition with as little controversy as possible. Video inspection shall be performed no more than 6 months prior to construction in the area and shall include audio descriptions of surface features along the entire line of the project. The preconstruction video shall be delivered in color audio-video MPEG file format and saved on CDs or DVDs for submittal.

The purpose of the still photography is to provide a permanent photographic record of the progress of the work. The Contractor shall provide preconstruction still photos as well as monthly construction still photos, showing the major components of the work. The Contractor shall supply two (2) copies of each photo taken. Each print shall be in color, with smooth surface, glossy finish, single weight paper, 8x10 inches in size, with label on front identifying the project, location and orientation of view, and date. In addition, the photos will be saved on CDs or DVDs and submitted in JPEG format.

As a minimum, one (1) still photo will be taken of each property affected by the construction activities. Insufficient video and photo documentation may result in the Contractor's Liability for all disputes concerning property restoration or damage.

PART 2 – DEFINITIONS AND ABBREVIATIONS

2.1 DEFINITIONS

Unless the context specifically indicates otherwise, the meaning of terms in the Village of Mt. Orab Utility Department Standard Specifications and Rules and Regulations shall be as follows:

Contractor. The party responsible for the wastewater collection and/or water distribution system work that is to be dedicated to, operated by or otherwise made part of the Utility Department, the legal representative of said party or the agent appointed to act for said party in the performance of the work.

Utility Department. The Village of Mt. Orab Utility Department or any properly authorized representative designated by the County Sanitary Engineer to act for said Department.

Drawings. The Standard Drawings contained herein, designating minimum material and construction standards for wastewater collection and water distribution system work that is to be dedicated to, operated by or otherwise made a part of the Utility Department.

Specifications. The Standard Specifications contained herein, designating minimum material and construction standards for wastewater collection and water distribution system work that is to be dedicated to, operated by or otherwise made a part of the Utility Department.

2.2 ABBREVIATIONS

Common abbreviations which may be found in the Village of Mt. Orab Utility Department Standard Specifications and Rules and Regulations are:

STANDARD ABBREVIATIONS

alternating current	a.c.	decibel	db
ante meridiem	a.m.	degree Centigrade (or	
ampere	A	Celsius) (i.e.)	20°C
Average	avg	degree Fahrenheit (i.e.)	68°F
diameter	dia	biochemical oxygen demand	BOD
direct current	d.c.	dollars	$
brake horsepower	bhp	British thermal unit	BTU
each	ea	efficiency	eff
Centigrade	C	Company	Co.
Fahrenheit	F	cubic inch	in^3 or cu in
feet	ft	cubic foot	ft^3 or cu ft
feet per hour	fph	cubic yard	CY or cu yd
feet per minute	fpm	cubic feet per minute	cfm
feet per second	fps	cubic feet per second	cfs
figure	Fig.	flange	flg
foot-pound	ft-lb	gallon	gal

ounce	oz	gallons per minute	gpm
outside diameter	OD	gallons per second	gps
gram	g	parts per million	ppm
phase	ph	Hertz	Hz
post meridiem	p.m.	hour	hr
pound	lb	horsepower	HP
Pounds per foot	lbs./ft.	pounds per square foot	psf
inch	in.	pounds per square inch	psi
inch-pound	in.-lb	pounds per square inch absolute	psia
inside diameter	ID	kilovolt-ampere	kva
pounds per square inch gauge	psig	kilowatt	kw
kilowatt-hour	kwh	revolution per minute	rpm
linear foot	lin ft	second	sec
liter	l	specific gravity	SG
square	sq	maximum	max
square foot	ft^2 or S.F.	mercury	Hg
square inch	in^2 or sq in	milligram	mg
square yard	SY or sq yd	milligrams per liter	mg/l
standard	std	milliliter	ml
standard cubic feet per minute	scfm	millimeter	mm
million gallons per day	mgd	million gallon	MG or mil.gal.
minimum	min	totally-enclosed-fan-cooled	TEFC
net positive suction head	npsh	volt	V
National Pipe Threads	NPT	number	No.

ORGANIZATIONAL ABBREVIATIONS

ACS	American Chemical Society
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGMA	American Gear Manufacturers Association
AIChE	American Institute of Chemical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APHA	American Public Health Association
AREA	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
CEMA	Conveyor Equipment Manufacturers Association
CIPRA	Cast Iron Pipe Research Association

CMS	Construction and Material Specifications (ODOT)
CRSI	Concrete Reinforcing Steel Institute
EPA	Environmental Protection Agency
FM	Factory Mutual
HEW	Department of Health, Education and Welfare
HUD	Department of Housing and Urban Development
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurance
ISO	Insurance Services Office
MSS	Manufacturers' Standardization Society of the Valve and Fitting Industry
NAAMM	National Association of Architectural Metal Manufacturers
NBS	National Bureau of Standards, U.S. Dept. of Commerce
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
OBBC	Ohio Basic Building Code
ODOT	Ohio Department of Transportation
OSHA	Occupational Safety and Health Act
PCI	Precast Concrete Institute
PFI	Pipe Fabrication Institute
SMACNA	Sheet Metal and Air Conditioning National Association
SSPC	Steel Structures Painting Council
TEMA	Tubular Exchanger Manufacturer's Association
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USGS	United States Geological Survey
USPHS	United States Public Health Service
WEF	Water Environment Federation
WWEMA	Water and Wastewater Equipment Manufacturers Association
WPCF	Water Pollution Control Federation

END OF SECTION

SECTION 1020 – MOBILIZATION

PART 1 – GENERAL

1.1 SCOPE OF WORK

The work shall consist of the mobilization and demobilization of the Contractor's forces and equipment necessary for performing the work required under the contract or as directed by the Owner's Representative.

Mobilization shall include all activities and associated costs for transportation of Contractor's personnel, equipment, and operating supplies to the site; establishment of offices, buildings, permits, project signage, and other necessary general facilities for the Contractor's operations at the site; premiums paid for performance and payment bonds, including coinsurance and reinsurance agreements as applicable; and other items specified in the contract documents.

Mobilization shall include the videotaping and the taking of still photographs of the entire project area with at least one photo of every driveway, ditch line and culvert pipe. All videos and photos shall be delivered to the Owner's Representative prior to the start of construction.

Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies not required or included in the contract from the site; including the disassembly, removal and site clean-up of offices, buildings and other facilities assembled on the site specifically for this contract.

This work includes mobilization and demobilization required by the contract at the time of award. If additional mobilization and demobilization activities and costs are required during the performance of the contract as a result of changed, deleted, or added items of work for which the Contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the item or items of work changed or added.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – SUBMITTALS (Not Applicable)

PART 4 – EXECUTION (Not Applicable)

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

Payment for Mobilization is full compensation for supplying and providing all materials, facilities, and services, and for performing all work necessary to complete this bid item.

Payment will not be made under this item for the purchase costs of materials having a residual value, the purchase costs of materials to be incorporated in the project, or the purchase costs of operating supplies.

The total amount of this item shall not exceed 5 percent of the total bid for all work described in these contract documents.

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Lump Sum (LS) price bid for Item 1020 – MOBILIZATION. Progress payments will be made based on the following schedule:

Percent of Contract Completed*	Percent of Mobilization
0 to 10	25
11 to 50	75
51 to 100	85

*Excluding this item.

The remaining 15 percent will be paid for demobilization. Demobilization is considered complete when all restoration called for under this contract is completed and when all of the Contractor's equipment and personnel are removed from the project site.

END OF SECTION

SECTION 1030 – CONSTRUCTION LAYOUT STAKING

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to perform the fieldwork, measurements, and computations required for the horizontal layout and vertical grades of the project in accordance with the project plans and specifications.

PART 2 – PRODUCTS (NONE)

PART 3 – SUBMITTALS

3.1 GENERAL

Submit the company name and the name of the Professional Surveyor, licensed in the State of Ohio, who is designated responsible for and in responsible charge of the Professional Surveying activities and decisions associated with the construction layout staking.

PART 4 – EXECUTION

4.1 GENERAL

Obtain and calculate benchmark data, grades, and alignment from the project plans and specifications or other benchmark or method as approved by the Owner's Representative.

The Contractor is responsible for reestablishment of control points, additional control points and maintenance of the horizontal and vertical control points and control point ties as needed for construction of the project. This includes replacement of any stakes and markings removed by the Contractor, or as a result of any action of the Contractor, Subcontractor, or others during the life of this Contract.

The contractor shall (or shall retain the professional services of one qualified to) furnish, set, reference, and maintain all stakes and markings necessary to establish the alignment, location, benchmarks, elevations, and continuous profile-grades for all work as needed for and throughout the project. The contractor shall supervise and coordinate all construction staking.

The construction survey records shall be available at all times during the progress of the work for examination and use by the Owner's Representative and when requested, copies shall be made available. The original field notebooks and other records shall be provided to and become the property of the Owner before final payment and acceptance of all work.

All work shall follow recognized professional practice and the standards of the industry.

4.2 STAKING LOCATIONS

The Contractor shall provide staking at all line and grade changes, at all control points, and at minimum every 100 feet along the pipeline sufficient for layout of the work.

The Contractor shall be responsible for obtaining the proper line and grade from the above mentioned stakes. The Contractor may use reference lines, stakes, laser beams, or any other method acceptable to the Owner's Representative to obtain proper lines and grade between these points.

The Contractor shall provide all surveying and staking required to determine the limits of the project in the field where necessary, or where required by the Owner's Representative, including but not limited to: Right-of-ways, easements, construction limits and property lines.

PART 5 – TESTING (none)

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Lump Sum (LS) price bid for Item 1030 – CONSTRUCTION LAYOUT STAKING. Progress payments will be made based on the measured quantities of Item 1030 completed. The Contractor shall review the submitted units completed and provide confirmation to the Owner's Representative of the measurements prior to payment for work under this specification.

END OF SECTION

SECTION 1100 – CLEARING AND GRUBBING

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary to perform clearing, grubbing, stockpiling of topsoil, and grading of topsoil as specified herein.

1.2 GENERAL

A. This work shall consist of clearing, grubbing, removal of trees and stumps, and removing and disposing of all vegetation and debris within the limits of the right-of-way and easement area, except such objects that are to remain or are to be removed in accordance with other sections of these specifications and/or identified on the plans.
B. Additional trees and other vegetation that are damaged as a result of the construction activities may be required, as directed by the Owner's Representative, to be removed in accordance with these specifications, at no additional cost to the Owner.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – SUBMITTALS (Not Applicable)

PART 4 – EXECUTION

4.1 CLEARING AND GRUBBING

A. All surface objects, brush, roots, and other protruding obstructions, not designated to remain, and all trees and stumps, shall be cleared and/or grubbed as required except for special treatment as follows:

    1. In locations to be seeded, stumps shall be removed to a minimum of 6 inches below ground surface.
    2. In locations along stream banks, stumps shall cut to the ground surface with roots left in place to assist with prevention of erosion.

4.2 TOPSOIL STOCKPILE AND GRADING

A. This item shall also include stripping of a minimum 12 inch layer of topsoil from the limits of excavation and stockpiling on-site.
B. Topsoils are those humus-bearing soils that can sustain plant life. Topsoil shall not be a mixture of contrasting textured subsoils, and shall contain less than 5 % by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than 1 1/2 " in diameter.

C. If the stockpiled topsoil is determined to not be sufficient for restoration by the Owner's Representative, the contractor must provide the appropriate topsoil from an offsite source.
D. The topsoil being used for restoration can be subjected to a Soil Analysis Test, at the Contractor's expense, from the onsite or offsite stockpiles to determine the percent of organic matter present. The topsoil shall contain between 4 percent and 20 percent organic matter.

E. Upon completion of construction in the adjacent area, topsoil shall be uniformly spread over the area previously stripped.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Lump Sum (LS) price bid for Item 1100 – CLEARING AND GRUBBING. Progress payments will be made based on the percentage of Item 1100 completed.

END OF SECTION

SECTION 1110 – TRAFFIC CONTROL AND MAINTENANCE

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary to maintain and protect vehicular and pedestrian traffic as specified herein.

1.2 GENERAL

A. The contractor shall maintain traffic in accordance with the "Ohio Manual of Uniform Traffic Control Devices for Streets and Highways", current edition, latest revisions.
B. Traffic Control and Maintenance is required within all public right-of-way in conjunction with and/or in addition to the requirements of any permits issued and in accordance with ODOT Item 614 Specifications.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – SUBMITTALS

3.1 24-HOUR CONTACT

A. The Contractor shall supply to the Owner's Representative the name and phone number of a person designated to be on call to repair or maintain the traffic control devices and driveway access in the event of an accident or emergency. This contact information must be provided prior to the commencement of any construction activities.

PART 4 – EXECUTION

4.1 TRAFFIC MAINTENANCE

A. If a lane closure is required, the appropriate right-of-way office must be immediately notified. Signs, cones, necessary barricades, and a minimum of two (2) properly trained flag persons shall be in place before any work requiring a lane closure begins.
B. Under no circumstance will lane closures remain in effect when work is suspended.
C. Access to private property within construction area shall be provided at all times. Occupants of affected properties shall be notified by the Contractor twenty-four (24) hours prior to removal of existing driveways. Existing driveways shall be replaced with suitable temporary driveways as soon as possible and shall not be out of service for more than two (2) hours at a time.

D. The CONTRACTOR shall fully cover with plywood any signs, either existing, permanent or temporary, which do not properly apply to the current traffic phasing, and shall maintain the covering until the signs are applicable or are removed.

E. Road construction and End Construction signs shall be installed at the limits of the construction project before any work begins. These signs shall be removed as soon as construction is completed.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

6.1 TRAFFIC CONTROL AND MAINTENANCE

Payment for all labor, material, and equipment necessary to perform traffic control and maintenance in conformance with approved right-of-way permits, the "Ohio Manual of Uniform Traffic Control Devices for Streets and Highways", current edition, latest revisions, and ODOT 614 specifications shall be at the Lump Sum (LS) price bid for Item 1110 – TRAFFIC CONTROL AND MAINTENANCE.

6.2 ROAD CLOSURES GRANTED POST BID

If approved permits, supplied during the bidding phase of the project, require maintenance of traffic and DO NOT account for any road closures, the Contractor must bid accordingly. If the Contractor requests and is granted a road closure after the bidding phase of the project, the Lump Sum bid for TRAFFIC CONTROL AND MAINTENANCE will be adjusted based on an agreed to DEDUCT in contract price between the Contractor and Owner's Representative.

END OF SECTION

SECTION 1120 – SOIL EROSION AND SEDIMENT CONTROL

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary to install and maintain erosion protection and sediment control as shown on the plans and specified herein.

GENERAL

A. The contractor shall perform soil erosion and sediment control in accordance with the most current "Village of Mt. Orab Water Management and Sediment Control Regulations" and all applicable regulations of the Ohio Environmental Protection Agency.
B. The contractor is responsible for providing and maintaining effective temporary erosion and sediment control measures during construction and until permanent controls become effective. The Owner's Representative will determine whether the controls are properly utilized.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – SUBMITTALS (Not Applicable)

PART 4 – EXECUTION

4.1 SOIL EROSION AND SEDIMENT CONTROL

A. Perform no clearing, grading, excavating, grubbing, or filling until erosion and sediment control measures are in place.
B. All controls must be inspected by the Contractor at least once every seven (7) calendar days, and within 24 hours of any rain event that produces more than 0.5 inches over the preceding 24 hours.
C. If controls are found to be non-performing, the Contractor must take immediate corrective action.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

6.1 SOIL EROSION AND SEDIMENT CONTROL

Payment for all labor, material, and equipment necessary to perform soil erosion and sediment control in conformance with the most current "Village of Mt. Orab Water Management and Sediment Control Regulation" and all applicable regulations of the Ohio Environmental Protection Agency shall be at the Lump Sum (LS) price bid for Item 1120 – SOIL EROSION AND SEDIMENT CONTROL.

50% of the Lump Sum price bid shall be paid upon approved installation of initial controls and the remaining 50% will be paid upon final completion of project and removal of temporary controls.

END OF SECTION

SECTION 1125 – SEEDING AND MULCHING

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to restore all non-paved surface areas to their pre-construction condition or better. Work shall include surface preparation, furnishing and placement of topsoil, seed, fertilizer, and mulch. Mulch shall include biodegradable fabric netting as indicated in these specifications.

Seeding and Mulching shall include a one year warranty on all work performed as outlined in Section B of the Project Specifications. The contractor shall be required to restore, reseed, and mulch, as needed, those areas of the project where seeding does not take hold or has washed out, during the warranty period.

Contractor is responsible for erosion control as outlined in Item 1120 – Erosion and Sediment Control throughout the life of the contract including the warranty period.

PART 2 – PRODUCTS

2.1 TOPSOIL

Contractor is responsible to stock pile existing top soil on site for reuse during site restoration as indicated in Item 1100 – Clearing and Grubbing. Any additional top soil required to complete the restoration activities shall be the responsibility of the contractor.

In areas where sufficient topsoil was not stock piled to provide the necessary material to establish a new grass surface, the contractor shall be responsible to provide the additional top soil as required.

Topsoil shall consist of a mixture of contrasting textured subsoils that are specifically blended to sustain grass seed to be planted.

2.2 SEED SPECIFICATIONS

New grass seed shall match the existing grass in all areas disturbed during the construction of this project, or as directed by owner. Where possible, the new grass seed shall be of type that is resistant to drought conditions.

2.3 EROSION CONTROL (MULCH) BLANKET

Erosion control blanket shall provide a temporary, biodegradable cover material to prevent slope and channel erosion. The blanket shall be suitable for the slope protection, channel and ditch linings,

reservoir embankments, culvert inlets and outfalls, and dikes, levees, and riverbanks. Blankets shall be made of non-plastic biodegradable material having a life expectancy of not more than 12 months.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of all material to be used for the seeding and mulching on this project. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 GENERAL

A. Contractor shall preform Seeding and Mulching activities in phases where indicated in the contract documents.
B. Contractor shall maintain erosion and sediment control during the seeding and mulching process.

4.2 PREPARATION

A. The Contractor shall loosen all disturbed areas to a depth of 3"-6". In areas where repeated access by heavy equipment or trucks has caused compaction, the Contractor shall loosen the soil to a depth of 12". The Contractor may use agricultural or construction equipment to perform the task.
B. The Contractor shall conduct final grading of all disturbed areas in conformance with the Project Drawings. All surfaces shall be smooth and free of rocks. On sloped areas (greater than 3:1), the Contractor shall use track equipment to compact the slope and produce ridges parallel to the slope contour.
C. Where topsoil has been stockpiled during the construction of the project, the contractor shall spread the topsoil on the disturbed areas after the soil has been loosened and the rough grading completed.
D. In all areas to be restored, the Contractor shall rake the seedbed surface to remove rocks and other debris. The surface shall be clear of obstructions and debris and must be suitable for mowing upon establishment of the seeding.

4.3 TOPSOIL

A. The topsoil shall be placed and uniformly spread over the areas to be restored, at a minimum depth of 3", as necessary to provide a proper soil layer for grass growth, unless otherwise specified or directed by the Owners Representative.
B. All surfaces shall be prepared to allow for proper drainage.

C. Topsoil shall be placed during favorable weather conditions that allow for proper placement of materials and germination of grass seed.

4.4 SEEDING

A. Hydro-seeding - The application of a combination of seed, fertilizer and mulch in a slurry mixture.

   Hydro-seeding mixtures shall be prepared on site, and applied immediately. No seed/mulch mix that has been left in the seeder for more than eight (8) hours shall be used.

B. Dry Seeding - This includes the use of conventional drop or broadcast spreader.
   - Upon seeding, the Contractor shall use a weighted roller over the area to provide for good seed to soil contact.
   - Where practical, seed shall be applied in two directions perpendicular to each other. Apply half of the seeding rate in each direction.
   - Dry seeding shall include the installation of mulch or mulch blankets to prevent erosion of the top soil and grass seed. Mulch blankets shall be installed, as necessary, in areas susceptible to wash out or wind blowing, including wind as a result of traffic flow.

All seed shall be incorporated into the top soil at a rate that provides for a finished grass thickness that is equal to or better that the pre-construction grass thickness.

PART 5 – TESTING

5.1 GENERAL

All seed must meet all applicable state and federal regulations and must include labeling indicating the supplier, formulation, germination rates and seed date. Seed may be subject to re-testing by a certified lab.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Lump Sum (LS) price bid for Item 1125 – SEEDING AND MULCHING. Progress payments will be made based on the percent of Item 1125 completed. The Contractor shall review the submitted units completed and provide confirmation to the Owners Representative of the measurements prior to payment for work under this specification. Payment for restoration of stockpile and storage areas or for areas outside of the construction limits (as defined on the plans) will not be approved.

All costs associated with additional mobilization and traffic control to complete this work shall be included in Items 1020 – Mobilization and 1110 – Traffic Control.

END OF SECTION

SECTION 1130 – CONCRETE PAVEMENT REPLACEMENT

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for concrete pavement replacement shown in the typical details and/or specified herein. Concrete pavement replacement shall include restoration of all concrete pavement damaged by, or as a result of, construction operations, equal or better than the condition that existed at the start of work.

PART 2 – PRODUCTS

2.1 CONCRETE

Concrete shall be Class C Concrete with a 28 day compressive strength of 4000 psi.

2.2 REINFORCING STEEL

Equal to or better than existing reinforcements. Contractor to field verify upon existing concrete removal. At minimum concrete reinforcements shall be welded steel wire fabric designation 6x6-W2 . 9xW29. (42 pounds per 100 square feet).

PART 3 – SUBMITTALS

Submit literature with product's physical properties. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 CONCRETE PAVEMENT REPLACEMENT

This item shall consist of furnishing and installing concrete and reinforcement for roadway, driveway, parking lot, sidewalk, curb and gutter, medians, and traffic island restoration at the locations and in accordance with the dimensions and instructions as shown on the plans and in accordance with the Standard Detail Drawings.

A. **Removal of Existing Pavement** - The pavement to be removed shall be marked with straight lines to a width beyond the damaged area, at least 12" on each side of the trench, or as directed by the owner's representative, and cut on neat lines by saw cutting and carefully removed to avoid damage to the remainder of the pavement. The pavement base shall then be loosened by air hammer, spade or point to break the bond with adjacent base. If saw cuts are within 4 feet of a formed joint in the existing pavement, then the existing slab shall be broken and removed to the joint.

B. Backfilling - After the bedding and pipe is installed as required by Section 1200, install backfill as directed by the road permit or as Section 1210 or 1220 requires.

Dowelled joints must be used when covering large areas, such as parking lots and roads, consistent with ODOT 451.08.

An asphalt or fiber expansion joint shall be used on light-use applications, such as driveway and sidewalks, when encountering a concrete slab or other fixed feature.

The depth/thickness of the concrete shall be equal to or greater than the existing concrete. Minimum thickness for driveways shall be 7".

Contractor is to maintain traffic until concrete pavement is restored.

C. Finish – The pavement must be properly placed on a leveled and compacted subgrade, placed with minimum slump, and finished as nearly as is possible to match the surface of the existing pavement, covered, protected and cured until traffic can be permitted upon it.

4.2 PAVEMENT MARKINGS

All pavement markings (lines, symbols, wording, etc.) shall be equal or better than the condition that existed at the start of work. The cost of this shall be incidental to all other work.

PART 5 – TESTING (As determined necessary)

PART 6 – BASIS OF PAYMENT

6.1 ROADWAY, DRIVEWAY, PARKING LOT, SIDEWALK, MEDIANS, AND TRAFFIC ISLANDS

Payment for all labor, material, and equipment necessary to perform concrete pavement replacement shall be based on the following bid items, units, and unit prices, and in conformance with the Standard Detail Drawings:

Item	Unit	Description
1130	Square Yard (SY)	Roadway
1130	Square Yard (SY)	Driveway
1130	Square Yard (SY)	Parking Lot
1130	Square Yard (SY)	Sidewalk
1130	Square Yard (SY)	Median, Traffic Island

The pay quantity for this item shall be calculated as follows:

L = length of trench parallel to pipe

W = width of trench (pipe OD + 48”) perpendicular to pipe

If authorized by the Owner’s Representative, concrete will be replace from edge of road to existing drive joint or saw cut.

SY = square yards

Pay quantity (SY) = (L x W)/9

The quantity of Concrete Pavement incorporated into the project is to be supported by original weight tickets from the material supplier and shall be approved by the Owner's Representative. The Contractor shall mark in writing on the ticket the appropriate Item of this contract for which this material was provided. The original weight tickets are for the use of the Owner or their representative and are not used as the basis for payment.

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid for specified Concrete Pavement item.

Removal of pavement, reinforcements, and pavement markings shall be incidental to all other work.

Careless or over excavation by the Contractor does not justify additional payment beyond the standard trench dimensions (ie dimensions of maximum payment).

6.2 CURB AND GUTTER

Payment for all labor, material, and equipment necessary to perform concrete pavement replacement shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
1130	Linear Foot (LF)	Curb and Gutter

The quantity of Curb and Gutter incorporated into the project is to be supported by original weight tickets from the material supplier and shall be approved by the Owner's Representative. The Contractor shall mark in writing on the ticket the appropriate Item of this contract for which this material was provided. The original weight tickets are for the use of the Owner or their representative and are not used as the basis for payment.

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid for specified Concrete Curb and Gutter item.

Careless or over excavation by the Contractor does not justify additional payment beyond the standard trench dimensions (ie dimensions of maximum payment).

END OF SECTION

SECTION 1140 – ASPHALT PAVEMENT REPLACEMENT

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for asphalt pavement replacement shown in the typical details and/or specified herein. Asphalt surface replacement shall include restoration of all asphalt pavement damaged by, or as a result of, construction operations, equal or better than the condition that existed at the start of work.

RELATED SPECIFICATION MATERIAL

- **A.** General Specification: Section 1200 Granular Bedding and Backfill Material
- **B.** General Specification: Section 1210 Controlled Density Fill (CDF)
- **C.** General Specification: Section 1220 Granular Backfill / Aggregate Base

PART 2 – PRODUCTS

2.1 Asphalt Concrete Base

Shall meet the composition requirements of ODOT Item 301.

2.2 Asphalt Concrete

Shall meet the description requirements of ODOT Item 448.

PART 3 – SUBMITTALS

Submit literature with product's physical properties to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 ASPHALT PAVEMENT REPLACEMENT OVER TRENCH AREA

This item shall consist of furnishing and installing asphalt pavement for roadway, driveway, parking lot, and sidewalk restoration at the locations and in accordance with the dimensions and instructions as shown on the plans.

- **A. Removal of Existing Pavement** - The pavement to be removed shall be marked with straight lines to a width beyond the damaged area, at least 12" on each side of the trench, or as directed by the owner's representative, and cut on neat lines by saw cutting and carefully removed to avoid damage to the remainder of the pavement. The pavement base shall then be loosened by air hammer, spade or point to break the bond with adjacent base.

B. Backfilling - After the bedding and pipe is installed as required by Section 1200, install backfill as directed by the road permit or as Section 1210 or 1220 requires. Driveway and sidewalk restoration will require 2 - 4 inch lifts of Granular Base (Section 1220) and roadways and parking lots will require 2 - 4 inch lifts of Asphalt Concrete Base. A 2 inch final layer, Asphalt Concrete, will be required for all asphalt pavement restoration. Tack coats are required anytime a surface course is placed on an intermediate course or an intermediate course on a base course. Contractor is to maintain traffic until asphalt pavement is restored.

C. Finish – The pavement must be properly placed on a leveled and compacted subgrade and finished as nearly as is possible to match the surface of the existing pavement, covered, protected and cured until traffic can be permitted upon it.

4.2 ASPHALT PAVEMENT DAMAGED DURING CONSTRUCTION

This item shall consist of furnishing and installing asphalt pavement for roadway, driveway, parking lot, and sidewalk restoration at the locations and in accordance with the dimensions and instructions as shown on the plans.

A. Removal of Existing Pavement - The pavement to be removed shall be marked with straight lines to a width beyond the damaged area and cut on neat lines by saw cutting and carefully removed to avoid damage to the remainder of the pavement. The pavement base shall then be loosened by air hammer, spade or point to break the bond with adjacent base.

B. Backfilling - After the bedding and pipe is installed as required by Section 1200, install backfill as directed by the road permit and as Section 1210 or 1220 requires. Driveway and sidewalk restoration will require 2 - 4 inch lifts of Granular Base (Section 1220) and roadways and parking lots will require 2 - 4 inch lifts of Asphalt Concrete Base. A 2 inch final layer, Asphalt Concrete, will be required for all asphalt pavement restoration. Tack coats are required anytime a surface course is placed on an intermediate course or an intermediate course on a base course. Contractor is to maintain traffic until asphalt pavement is restored.

C. Finish – The pavement must be properly placed on a leveled and compacted subgrade and finished as nearly as is possible to match the surface of the existing pavement, covered, protected and cured until traffic can be permitted upon it.

4.3 PAVEMENT MARKINGS

All pavement markings (lines, symbols, wording, etc.) shall be equal or better than the condition that existed at the start of work. The cost of this shall be incidental to all other work.

PART 5 – TESTING (Not Applicable)

PART 6 - BASIS OF PAYMENT

6.1 ASPHALT PAVEMENT REPLACEMENT OVER TRENCH AREA

Payment for Granular Base required for asphalt pavement replacement shall be paid under Section 1220, Granular Backfill & Bedding. Payment for all other labor, material, and equipment necessary to perform asphalt pavement replacement shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
1140	Cubic Yard (CY)	Asphalt Concrete Base
1140	Cubic Yard (CY)	Asphalt Concrete

The pay quantity for this item shall be calculated as follows:

L = length of trench parallel to pipe

W= width of trench (pipe OD + 48”) perpendicular to pipe

D = depth of material

CY = cubic yards

Pay quantity (CY) = (L x W x D)/27

The quantity of Asphalt Concrete Base and Asphalt Concrete incorporated into the project is to be supported by original weight tickets from the material supplier and shall be approved by the Owner's Representative. The Contractor shall mark in writing on the ticket the appropriate Item of this contract for which this material was provided. The original weight tickets are for the use of the Owner or their representative and are not used as the basis for payment.

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid for specified Asphalt Concrete Base and Asphalt Concrete items.

Removal of pavement, tack coat, joint sealer, and pavement markings shall be incidental to all other work.

Careless or over excavation by the Contractor does not justify additional payment beyond the standard trench dimensions (ie dimensions of maximum payment).

END OF SECTION

SECTION 1150 – GRAVEL DRIVEWAY REPLACEMENT

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for gravel driveway replacement shown in the typical details and/or specified herein. Gravel driveway replacement shall include restoration of all gravel surfaces damaged by, or as a result of, construction operations, equal or better than the condition that existed at the start of work.

PART 2 – PRODUCTS

2.1 GRAVEL

Gravel shall match the color and consistency of the existing driveway material.

PART 3 – SUBMITTALS (Not Applicable)

PART 4 – EXECUTION

4.1 GRAVEL DRIVEWAY REPLACEMENT

This item shall consist of furnishing, placing, and compacting one or more courses of aggregate on a prepared surface.

A. Backfilling - The bedding, backfill, and pipe shall be installed as required by Section 1200, 1210, or 1220.

B. Finish –The surface course must be equal to that of the existing drive.

PART 5 – TESTING (Not applicable)

PART 6 – BASIS OF PAYMENT

6.1 GRAVEL DRIVEWAY

Payment for all labor, material, and equipment necessary to perform gravel driveway replacement shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
1150	Cubic Yard (CY)	Gravel

The pay quantity for this item shall be calculated as follows:

L = length of gravel

W = width of gravel (pipe OD + 48”)

D = depth of gravel

CY = cubic yards

Pay quantity (CY) = (L x W x D)/27

The quantity of Gravel Driveway incorporated into the project is to be supported by original weight tickets from the material supplier and shall be approved by the Owner's Representative. The Contractor shall mark in writing on the ticket the appropriate Item of this contract for which this material was provided. The original weight tickets are for the use of the Owner or their representative and are not used as the basis for payment.

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid for specified Gravel Driveway Replacement item.

Careless or over excavation by the Contractor does not justify additional payment beyond the standard trench dimensions (ie dimensions of maximum payment).

END OF SECTION

SECTION 1160 – DRIVEWAY CULVERT / DRAIN TILE REPLACEMENT

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for removing existing, furnishing and installing new driveway culvert pipe or drain tile pipe damaged during construction, as shown on the Contract Drawings or as directed by the Owner's Representative.

PART 2 – PRODUCTS

Replacement driveway culvert pipe or drain tile pipe shall be replaced in like kind (equal size and material) unless otherwise directed by Owner's Representative or applicable permit.

New driveway culvert pipe or drain tile pipe shall be 12 inches or greater corrugated metal pipe or HDPE plastic pipe or as directed by the Owner's Representative or applicable permit.

PART 3 – SUBMITTALS

Submit literature and/or catalog cut sheets of the driveway culvert/drain tile pipe to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Prior to the removal of the existing driveway culvert or drain tile pipe, the Contractor shall establish the existing size, elevation and location of the pipe inverts for the pipe that is to be removed. All information is to be made available to the Owner's Representative prior to the pipe's removal.

The Contractor shall reestablish the ditch line leading to and from the replaced driveway culvert or drain tile pipe immediately following the driveway culvert or drain tile pipe installation, unless the continuing pipe installation activities interfere with that reestablishment.

The Contractor is responsible for maintaining erosion control in the area of the newly installed driveway culvert or drain tile pipe. During the life of the contract, the contractor is responsible to remove any material that may enter and settle in the culvert or drain tile pipe.

This item includes all bedding and backfill material to install the driveway culvert pipe or drain tile.

Driveway culvert pipe and drain tile that is damaged during construction and is located outside of the trench limits as described on the contract drawings, shall be replaced by the Contractor at the contractor's expense.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid per Linear Feet (LF) for Item 1160 – DRIVEWAY CULVERT OR DRAIN TILE REPLACEMENT. Progress payments will be made based on the installed linear feet of Item 1160 completed.

END OF SECTION

SECTION 1170 – STREAM CROSSINGS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary to furnish and install all stream crossings shown on the plans and/or specified herein.

PART 2 – PRODUCTS

2.1 CONCRETE

Concrete used for encasement of stream crossings shall be of 4,000 psi compressive strength installed according to the Standard Drawings of the Village of Mt. Orab Utility Department.

2.2 RIP RAP

Rip Rap used for protection of stream crossings shall be Class "C" Rip Rap installed according to the Standard Drawings of the Village of Mt. Orab Utility Department. Rip Rap shall be installed where shown on the drawings or where directed by the OWNER'S REPRESENTATIVE.

2.3 PIPE JOINT RESTRAINT

Pipe joint restraints shall be Field Lok Gasket, American Fast Grip, or approved equal as determined by Owner's Representative.

PART 3 – SUBMITTALS (Not Applicable)

PART 4 – EXECUTION

4.1 GENERAL

The stream crossings shall be installed to protect the pipe, streambed and banks from erosion. As much as practicable, the stream banks and streambed shall be restored to equal to or better than their original condition. It is the CONTRACTOR'S responsibility to minimize the impacts of construction and to implement the requirements of the specifications for the stream crossing(s).

The top foot of excavated material within the streambed, stream bank and riparian area shall be temporarily stored outside of the riparian area, if possible, for use during restoration, unless otherwise shown on the plans or approved by the OWNER'S REPRESENTATIVE. Silt fence shall be installed and

maintained around all stored material. At locations where construction equipment will be crossing the stream, the CONTRACTOR shall construct a temporary stream crossing using culverts or another acceptable method as approved by the OWNER'S REPRESENTATIVE.

Each stream crossing shall be completed within twenty-four (24) hours, unless otherwise approved *in writing* by the OWNER'S REPRESENTATIVE. Stream bank and stream bed restoration shall be completed within forty-eight (48) hours of completing the stream crossing construction.

4.2 CLEARING OF VEGETATION

Clearing for all stream crossings shall be limited to a 20-foot width through the riparian area unless otherwise specified or shown on the plans. Tree removal within the riparian area shall be performed only where absolutely necessary for construction. In cases where a tree (or, any other vegetation) must be removed for construction purposes, the tree (or, any other vegetation) should be either cut at the ground or one to two feet above the ground so the root mass is maintained.

4.3 DIVERSION OF STREAM FLOW

The CONTRACTOR will be responsible to maintain all flow within the stream channel. This may be accomplished by use of a temporary dam of sand bags and culvert pipe(s). At no time shall excavated material be used to create a temporary dam or divert stream flow. All stream bed and stream bank restoration within the dammed area shall be completed prior to removal of the temporary dam(s).

4.4 PIPE INSTALLATION/ CONCRETE ENCASEMENT

Gravity sewer mains shall be protected from erosion by use of concrete encasement when the depth of the sewer is less than eight (8) feet. Concrete encasement shall be installed in accordance with the Standard Drawings of the Village of Mt. Orab Utility Department. Where the depth of the gravity sewer exceeds eight (8) feet, the use of compacted backfill is acceptable. Unless, otherwise directed by the OWNER'S REPRESENTATIVE.

Water mains and sewage force mains shall be installed a minimum of five (5) feet below the bottom of the streambed and shall be protected from erosion by use of concrete encasement in accordance with the Standard Drawings of the Village of Mt. Orab Utility Department. Pipe joint restraints shall be installed at all creek crossings to at least twenty foot outside of the concrete encasement both directions.

4.5 STREAM BANK RESTORATION

Stream bank restoration includes final grading of stream banks to an acceptable grade and vegetating and/or placing of rip rap. All backfill shall be mechanically compacted. The top foot of excavated material that was temporarily stored shall be replaced during restoration. In some cases, where shown

on the plans or directed by the OWNER'S REPRESENATIVE, compacted earth backfill shall be placed to approximately two (2) feet below the final ground surface and rip rap shall be placed in accordance with the Standard Drawings of the Village of Mt. Orab Utility Department.

4.6 STREAMBED RESTORATION

The trench within the streambed shall be backfilled with mechanically compacted earth to approximately one (1) foot below the original ground surface. The top foot of excavated material that was temporarily stored shall be replaced during restoration. Where shown on the plans or directed by the OWNER'S REPRESENATIVE, compacted earth backfill shall only be placed to approximately two (2) feet below the original ground surface and rip rap will be placed in accordance with the Standard Drawings of the Village of Mt. Orab Utility Department.

In the event that bedrock is encountered during excavation of the trench through the streambed, concrete shall be used for backfill from the top of the bedrock down a maximum of three (3) feet.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

6.1 STREAM CROSSINGS

Payment for all labor, material, and equipment necessary to perform and restore stream crossings shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
1170	Cubic Yard (CY)	Concrete Encasement
1170	Cubic Yard (CY)	Rip Rap

Payment will not be made for materials installed beyond the limits required by the plans, specifications and/or Standard Drawings of the Village of Mt. Orab Utility Department. Concrete placed where bedrock is encountered shall be paid at the unit price bid for Concrete Encasement. All other costs associated with stream crossings shall be included in the unit bid prices for the pipe.

END OF SECTION

SECTION 1180 – KEYBLOCK ANCHORS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to install keyblock anchors for water or sewer mains on steep slopes as shown on the plans or as directed by the owner's representative.

PART 2 – PRODUCTS

2.1 GENERAL

Acceptable products shall meet or exceed the Standard Detail Drawings and shall be installed under the direction of the Owners Representative.

2.2 REINFORCING BARS

All reinforcing steel shall conform to ASTM A 615 including Supplementary Requirements. All reinforcing steel shall be 60,000 psi yield strength.

All reinforcement shall be cold bent, unless otherwise specifically permitted by the Owners Representative.

Reinforcing bar layout to be as shown on the Standard Detail Drawings.

2.3 CONCRETE

Concrete shall be Class C with a minimum compressive strength of 4000 PSI.

PART 3 – SUBMITTALS

3.1 GENERAL

Acceptable products shall meet or exceed the requirements for keyblock anchors as shown on the Standard Detail Drawings.

PART 4 – EXECUTION

4.1 PIPELINE

Where keyblock anchors are required, all pipeline shall be Ductile Iron Class 52 with restrained joints unless otherwise indicated on drawings or as directed by the Owners Representative.

4.2 MINIMUM SPACING

Water or sewer pipelines constructed on 15% slope or greater shall be anchored securely with concrete anchors or equal as shown in the Standard Detail Drawings. Required minimum anchorage is as follows:

a. Not over 36 feet center-to-center on grades 15% and up to 35%.

b. Not over 24 feet center-to-center on grades 35% and up to 50%.

c. Not over 16 feet center-to-center on grades 50% and over.

4.2 ELEVATION AND SECTION

Dimensions of keyblock anchor as shown on the Standard Detail Drawings.

4.3 FORMWORK

Keyblock anchors may be trenched (excavated neat) and cast without formwork if the soil is suitable (in undisturbed earth) as determined by the Owner's Representative.

Forms, where necessary, shall be constructed and removed in such a manner that will not cause damage to the concrete. Concrete work shall be protected from damage during construction. The Contractor is responsible for repairing any damage to the concrete without any additional expense to the Owner or delay in construction.

4.4 REINFORCEMENT

All reinforcing steel shall conform to ASTM A 615 including Supplementary Requirements. All reinforcing steel shall be 60,000 psi yield strength.

All reinforcement shall be cold bent, unless otherwise specifically permitted by the Owner's Representative.

PART 5 – TESTING

5.1 GENERAL

The Contractor is responsible for correction of concrete work which does not conform to the Specifications and Drawings including strength, tolerances and finishes. This includes correcting deficient concrete at no additional expense to the Owners Representative to the satisfaction of the Owners Representative.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Each (EA) price bid for Item 1180 – KEYBLOCK ANCHORS. Progress payments will be made based on the measured quantities of Item 1180 completed. The Contractor shall review the submitted units completed and provide confirmation to the Owners Representative of the measurements prior to payment for work under this specification.

END OF SECTION

SECTION 1190 – JACK AND BORE WITH STEEL CASING

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to complete the construction of steel casing pipe and to complete the construction of boring to the lines and grades detailed on the plans including all excavation, backfilling, jacking, tunneling, sealing, jointing, dewatering, construction of bulkheads, additional flagmen and safety devises as may be required and all necessary and miscellaneous items detailed as required to complete the work as shown on the Plans, including casing spacers and end seals.

PART 2 – PRODUCTS

2.1 STEEL CASING PIPE

Steel pipe used for casing shall be smooth steel with minimum yield strength of 35,000 psi. The inside diameter of the casing pipe shall be a minimum of four (4) inches larger than the largest outside diameter of the water or sewer line. Wall thickness and casing diameter shall be based on the following schedule for PVC and Class 52 Ductile Iron Pipe:

Pipe Size (inches)	Casing OD (inches)	Wall Thickness (inches)
6 to 8	16	3/8
10	18	3/8
12	22	3/8
14 to 20	30	½
21 to 24	36	½
27 to 30	40	½

Larger diameter casing pipe may be substituted by the CONTRACTOR; however, there will be no extra cost to the OWNER for this substitution.

2.2 SPACERS AND END SEALS

Casing spacers shall be model CCS stainless steel casing spacers as manufactured by Cascade Waterworks Mfg. Co. of Yorkville, IL (1-800-426-4301), Model BWM-SS as manufactured by BWM Company or approved equal. End seals shall be model CCES as manufactured by Cascade Waterworks, model BWM-PO as manufactured by BWM Company or approved equal.

2.3 RESTRAINED JOINTS

Within the casing pipe, all pressure pipe shall have restrained joints in accordance with Section 2110 for Ductile Iron Water Main, Section 2120 for PVC Water Main, and/or Section 3310 for PVC Sewer Force Main.

PART 3 – SUBMITTALS

3.1 STEEL CASING PIPE

Submit literature and/or catalog cut sheets of the steel casing pipe to be used. Submit to the Owner's Representative for review and approval prior to ordering.

3.2 SPACERS AND END SEALS

Submit literature and/or catalog cut sheets of the spacer and end seal system to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 STEEL CASING

Steel casing pipe shall be bored and/or jacked in place at the grade and elevations shown on the drawings. All joints between lengths shall be solidly butt-welded with a smooth, non-obstructing joint inside.

4.2 CARRIER PIPE

Carrier pipe shall be installed after the casing is in place. Restrained joints are required for all pressure pipe (water main or sanitary force main) within the casing pipe.

4.3 SPACERS AND END SEALS

Spacers and end seals shall be installed in accordance with the manufacturer's recommendations. For the Cascade and BWM Spacer Systems and ductile iron pipe, one spacer shall be placed not more than

two (2) feet from each end of the casing. Subsequent spacers shall be placed at 10 foot intervals within the casing.

For the Cascade and BWM Spacer Systems and PVC pipe, one (1) spacer shall be placed on the spigot end of each segment at the line marking the limit of insertion into the bell. When the joint is complete, the spacer shall be in contact with the bell of the joint so that the spacer pushes the joint and relieves compression within the joint. Subsequent spacers shall be placed at six (6) foot intervals.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

Payment for all labor, material, and equipment necessary to install steel pipe encasement shall be paid at the Contract unit price per lineal foot, complete in place, and shall include the price for casing spacers, end seals, and all other items necessary for construction as shown on the drawings and/or described in the specifications. Measurement for the steel casing pipe will be from end to end of the completed casing pipe in place.

END OF SECTION

SECTION 1200 – GRANULAR BEDDING AND INITIAL BACKFILL MATERIAL

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to place and compact the granular bedding and initial backfill material where shown on the plans, required by these specifications, or where directed by the Owner's Representative.

PART 2 – PRODUCTS

2.1 GRANULAR BEDDING AND INITIAL BACKFILL FOR PIPE WITH ≤15' OF COVER

Granular Bedding and Initial Backfill Material for pipes with 15' or less cover shall meet all material requirements of ODOT Item 703.11, Structural Backfill Type 2, except that no slag material will be accepted.

In cases where the trench bottom consists of mucky and/or unstable conditions, which requires over-excavation to reach stable soils, AASHTO #57 stone shall be used for bedding and initial backfill, regardless of depth.

2.2 GRANULAR BEDDING AND INITIAL BACKFILL FOR PIPE WITH >15' OF COVER

Granular Bedding and Initial Backfill Material for pipes with depth of cover that exceeds 15' shall be AASHTO #57 stone.

PART 3 – SUBMITTALS

Submit sieve analysis and/or literature for all bedding and initial backfill material to be used, including identification of the supplier. Submit to Owner's Representative for review and approval. A submittal is not required for bulkhead material used in accordance with Paragraph 4.3 of this Section.

PART 4 – EXECUTION

4.1 BEDDING PREPARATION

After preparation of the trench bottom, a minimum 6" depth of pipe bedding shall be placed the full width of the trench bottom and should be prepared to provide appropriate line and grade of the pipe. Blocking must not be used to bring the pipe to grade.

In cases where the trench bottom consists of mucky and/or unstable conditions, the Contractor shall remove the unstable soil to a depth as directed by the Owner's Representative. The soils removed shall be replaced with AASHTO #57 stone and installed in 6 inch loose lifts and mechanically compacted.

4.2 INITIAL BACKFILL

Backfill shall be carefully placed in the trench as to not damage the pipe. The backfill material shall be so placed as to fill the void under the lower part of the pipe by slicing under the haunches with a shovel to the springline of the pipe. The haunching material provides side support for the pipe and is most important for controlling pipe deflection. The remainder of the backfill material shall be carefully placed to a minimum of 12" over the top of the pipe.

4.3 BULKHEADS

The CONTRACTOR shall place bulkheads of clean clay soil around the pipe and across the full width of the trench at 100 foot intervals to resist the movement of groundwater through the granular material and erosion of the granular material. Such bulkheads shall be carefully compacted and shall extend 3 feet in a direction parallel to the pipe and shall extend from the bottom of the trench to a height 12 inches over the top of the pipe.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

Payment for all labor, material, and equipment necessary to install the granular bedding and initial backfill in accordance with theses specifications shall be included in the unit price of the pipe.

Where special bedding and backfill is required due to wet and/or unstable soil conditions that are outside the control of the CONTRACTOR, the CONTRACTOR will be compensated in accordance with Paragraph 19, Changes in Work, of the Standard General Conditions of the Construction Contract.

Additional compensation will not be granted for wet and/or unstable soil conditions created due to actions of the CONTRACTOR.

END OF SECTION

SECTION 1210 – CONTROLLED DENSITY FILL (CDF)

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to place a flowable mixture of portland, fly ash, and sand and/or low strength mortar backfill for backfilling trenches under various combinations of pavement within the public Right-of-Way or other locations as shown on the Project Drawings, as specified or as directed by the Owner's Representative.

1.2 GENERAL

CDF is to be trench backfill below subgrade level for all trenches in or within three (3) feet of the edge of existing pavement. The Right-of-Way permitting agency reserves the right to make modifications to these requirements. Any permitted modifications shall be in writing by the Right-of-Way permitting agency and may include other engineering and/or construction requirements not shown in this specification.

PART 2 – PRODUCTS

2.1 GENERAL

CDF shall conform to ODOT's low strength mortar backfill specification and/or HAM/CIN CLSM Specification or approved equal. CDF shall be installed under the direction of the Owners Representative or as outlined in the plans and specifications.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of the materials to be used for review & approval by the Owners Representative prior to ordering.

PART 4 – EXECUTION

4.1 GENERAL

Mixing Equipment: Sufficient mixing capacity and delivery equipment shall be provided to permit the CDF mixture to be placed without interruption as much as practicable. CDF mixtures may be placed in intermittent horizontal lifts as approved by the Right-of-Way permitting agency.

Placing Mixtures: CDF mixtures shall be discharged from the mixing and/or delivery equipment by any reasonable means into the spaces to be filled. The placing of other materials over the low strength mortar backfill may commence as specified further herein, as soon as the surface water has dissipated, or as directed by the Right-of-Way permitting agency.

Type I mixtures - For these mixtures, the placing of asphaltic concrete materials shall not occur until a minimum of twenty-four (24) hours had elapsed following placement of the backfill or until approved by the Village of Mt. Orab Engineer or his representative.

Type III mixtures - For these mixtures, the placing of asphaltic concrete materials shall not occur until a minimum of four (4) hours has elapsed following placement of the backfill unless a pentrometer test in accordance with ASTM C-403.88 indicates average resistance strength of 400 PSI in less time to until approved by the Right-of-Way permitting agency or his Representative.

Limitation Of Operations:

- The mixtures shall not be placed on frozen ground.
- The placed mixtures shall be protected from freezing.
- Each filling stage shall be as continuous as possible.
- Curing time of CDF may be affected by temperature. At temperatures near freezing or below, additional time may be needed for proper cure of the material prior to any type of paving operation.

PART 5 – TESTING

5.1 GENERAL

The Contractor is responsible for correction of concrete work which does not conform to the Specifications and Drawings including strength, tolerances and finishes. This includes correcting deficient concrete at no additional expense to the Owners Representative to the satisfaction of the Owners Representative.

PART 6 – BASIS OF PAYMENT

Calculated quantities shall be paid in cubic yards based on the actual field measured dimensions and should coincide with the dimensions of maximum payment as specified in the Plans unless otherwise authorized by the Owner's Representative.

The pay quantity of Item 1210 - Controlled Density Fill shall be calculated as follows:

L = length of trench parallel to pipe containing Controlled Density Fill

W = width of trench perpendicular to pipe containing Controlled Density Fill

D = depth of trench containing Controlled Density Fill

CY = cubic yards

Pay quantity (CY) = (L x W x D)/27

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Cubic Yard (CY) price bid for Item 1210 – CONTROLLED DENSITY FILL (CDF). Progress payments will be made based on the measured quantities of Item 1210 completed. The Contractor shall review the submitted units completed and provide confirmation to the Owners Representative of the measurements prior to payment for work under this specification.

Careless or over excavation by the Contractor does not justify additional payment beyond the standard trench dimensions (ie dimensions of maximum payment).

END OF SECTION

SECTION 1220 – AGGREGATE BACKFILL & BASE MATERIAL

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to place and compact the aggregate backfill / aggregate base material where shown on the plans, required by these specifications, or where directed by the Owner's Representative.

PART 2 – PRODUCTS

2.1 AGGREGATE BACKFILL & BASE

Aggregate Backfill & Base Material shall meet all material requirements of ODOT Item 304.

PART 3 – SUBMITTALS

Submit sieve analysis and/or literature for aggregate backfill material to be used, including identification of the supplier. Submit to Owner's Representative for review and approval.

PART 4 – EXECUTION

4.1 AGGREGATE BACKFILL & BASE

Where aggregate backfill & base is required, the trench shall be backfilled with aggregate material so placed and compacted as to make a satisfactory pavement subgrade and prevent further settlement. Aggregate material shall be placed in maximum layers of 6 inches in thickness and mechanically compacted. Use of the excavator bucket to obtain compaction is not permissible.

PART 5 – TESTING

5.1 COMPACTION TESTING

Where required, the CONTRACTOR will be responsible to provide an independent testing agency to perform backfill compaction testing and provide written reports. Testing and reporting will be in accordance with appropriate right-of-way permits and as directed by the OWNER'S REPRESENTATIVE.

PART 6 – BASIS OF PAYMENT

Payment for all labor, material, and equipment necessary to perform aggregate backfill shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
1220	Cubic Yard (CY)	Aggregate Backfill & Base

Calculated quantities shall be paid in cubic yards based on the actual field measured dimensions and should coincide with the dimensions of maximum payment as specified in the Plans unless otherwise authorized by the Owner's Representative. Unless authorized by the Owner's Representative, additional quantities required for restoration beyond the dimensions specified on the plans and below shall be at the Contractor's expense.

The pay quantity of Item 1220, Aggregate Backfill & Base, shall be calculated as follows:

L = length of trench parallel to pipe containing Aggregate Backfill & Base

W = width of trench (pipe O.D. + 24", max.) perpendicular to pipe containing Aggregate Backfill AND width of trench (pipe O.D. + 48", max.) perpendicular to pipe containing Aggregate Base

D = depth of trench containing Aggregate Backfill AND depth of Aggregate Base

CY = cubic yards

Pay quantity (CY) = (L x W x D)/27

The quantity of Aggregate Backfill & Base incorporated into the project is to be supported by original weight tickets from the material supplier and shall be approved by the OWNER'S REPRESENTATIVE. The CONTRACTOR shall mark in writing on the ticket the appropriate Item of this contract for which this material was provided. The original weight tickets are for the use of the OWNER'S REPRESENTATIVE and are not used as the basis for payment. Removal and disposal of excess material due to using aggregate material shall be included in this item.

Careless or over excavation by the CONTRACTOR does not justify additional payment beyond the standard trench dimensions (i.e. dimensions of maximum payment).

END OF SECTION

SECTION 1300 – CONTINGENCY

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary to provide work as directed by the Owner's Representative.

This item is a specific provision for unforeseeable elements of cost within the defined project scope. This item covers costs that may result from incomplete design, unforeseen and unpredictable conditions, or minor design changes within the defined project scope. Contingency is not to be used by the contractor to avoid making an accurate assessment of expected cost. Contingency amounts will be awarded as directed by the Owner's Representative and are not a guaranteed form of compensation for construction of the project.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – SUBMITTALS (Not Applicable)

PART 4 – EXECUTION

All work shall be completed as described in the Contract Documents and as directed by the Owner's Representative.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

This item includes a defined sum of money set aside for contingencies. Contingency monies are only payable with an approved Design Change Notice form from the Owner's Representative.

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the pre-determined cost for Item 1300 – CONTINGENCY. Progress payments will be made based on the work completed under Item 1300 – Contingency.

END OF SECTION

SECTION 2110 – DUCTILE IRON WATER MAIN AND DUCTILE IRON FITTINGS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for furnishing and installing ductile iron water main pipe and ductile iron water main fittings as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.2 GENERAL

This work shall consist of providing all labor, materials, and equipment necessary for furnishing and installing ductile iron water main pipe and fittings including all bends, reducers, tees, sleeves, and special castings required for the installation of the valves, strapping, placement of concrete thrust blocks, and all other work required for furnishing and installing water mains complete and ready for service as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

The water main and fittings shall be installed in accordance with the Contract Drawings, the American Water Works Association (AWWA) for potable water main and fittings installation, the Village of Mt. Orab Utility Department Standard Specifications and Rules and Regulations, and the Owner's Representative.

1.3 RELATED WORK

A. Section 1130 Concrete Pavement Replacement
B. Section 1140 Asphalt Pavement Replacement
C. Section 1150 Gravel Driveway Replacement
D. Section 1170 Stream Crossings
E. Section 1180 Keyblock Anchors
F. Section 1190 Jack and Bore with Steel Casing
G. Section 1200 Granular Bedding and Initial Backfill Material
H. Section 1210 Controlled Density Fill (CDF)
I. Section 1220 Aggregate Backfill & Base Material

PART 2 – PRODUCTS

2.1 DUCTILE IRON PIPE

Ductile iron pipe shall be of ductile, centrifugally cast type in accordance with ANSI A21.51 (AWWA C-151), except as herein modified:

Hardness:	Rockwell B-90 maximum
Corrosion Allowance:	0.08 inches minimum

For inside structures and for outside installation above ground, all pipes shall be Class 53 in accordance with ANSI A 21.15 (AWWA C-115). Additionally, all outside above ground pipe shall have foamglass insulation and corrugated metal sleeve of appropriate sizes to prevent freezing, as approved by the Owner's Representative.

For all in-ground installations the pressure class shall be Class 52, unless a higher class is required by laying conditions or pressure in accordance with ANSI A21.50 and approved by the Owner's Representative.

All ductile iron pipes shall have a bituminous coated cement lining complying with AWWA C-104 and shall have an outside coating of bitumastic enamel or approved equal.

All ductile iron pipes shall be provided with either mechanical joint ends or push-on joints ends.

2.2 DUCTILE IRON FITTINGS

All fittings, wall pipes and specials shall be of ductile iron or in accordance with ANSI A21.10 (AWWA C-153).

All fittings shall have a bituminous coated cement lining complying with AWWA C-104 and shall have an outside coating complying with AWWA C-153 or an epoxy coating complying with AWWA C-116.

All ductile iron fittings shall be provided with and assembled using mechanical joint ends and retainer glands.

2.3 CONCRETE THRUST BLOCKING

Concrete thrust blocking, supports and/or buttresses shall be provided at all tees and bends and at any other locations required by the District. These concrete structures shall be built to the lines, grades and dimensions shown on the Standard Drawings. Concrete used for blocking shall conform to Class C Concrete, having a compressive strength of 4,000 pounds per square inch.

All concrete shall be mixed by mechanical means prior to installation. The installation of dry concrete will not be permitted.

2.4 PIPE JOINT RESTRAINT

Pipe joint restraints shall be Field Lok Gasket, American Fast Grip, or approved equal as determined by Owner's Representative, except as modified herein.

All fire hydrant leads and fire hydrant assemblies shall be restrained using Megalug Series 1100 Mechanical Joint Restraint or Sigma Corporation One-Lock Series SLDE Mechanical Joint Restraint for Ductile Iron Pipe or approved equal as determined by Owner's Representative.

2.5 POLYETHYLENE ENCASEMENT

Polyethylene encasement shall be installed in accordance with ANSI/AWWA C105/A21.5 and these Specifications. The polyethylene encasement shall be a low-density polyethylene film made from virgin low-density polyethylene raw material conforming to ASTM D4976 and shall be a minimum of eight mils in thickness.

PART 3 – SUBMITTALS

3.1 DUCTILE IRON WATER MAIN PIPE AND FITTINGS

Submit literature and/or catalog cut sheets of the ductile iron water main pipe and fittings to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 GENERAL

The Contractor shall furnish all necessary labor, material, tools, and equipment required in the installation of the water main pipe and fittings. This work includes furnishing all materials, the proper storage of those materials, saw cutting, excavation, laying and joining the pipe, installation of concrete blocking and joint restraints, bedding, initial backfilling, repairing or replacing all drains, sewers, utilities, and any other structures that may be disturbed or damaged by the Contractor's operations including driveway culvert pipes, and restoration of all disturbed surfaces, including all pavement restoration. Also included in this item are the disposition of all excavated materials and the chlorination of the pipe line and fittings in place. All work shall be completed as shown on the Contract Drawings and as directed by the Owner's Representative.

Pipe and fittings shall be handled so that the joints, coating and/or lining will not be damaged. If, however, any part of the jointing coating or lining is damaged, the repair or replacement of such material shall be made by the Contractor at his own expense in a manner satisfactory to the Owner's Representative.

All pipe and fittings stored on the job site shall be placed on blocks and suitably chocked to eliminate any possibility of rolling or shifting. Blocks and chocks shall have a minimum thickness of 2 inches and shall be high enough to assure that the pipe and fittings will not be touched by surface drainage.

The Contractor is responsible to repair or replace all pavement and roadway surface disturbed by the contractor, as a result of the water main and fittings installation, to the satisfaction of the governing entity of said pavement or roadway surface.

The Contractor is responsible to notify all affected property owner's in writing a minimum of 48 hours prior to all shutdowns per the Village of Mt. Orab Utility Department's Standard Operating Procedures and as directed by the Owner's Representative.

4.2 INSTALLATION

The general proposed location of the water mains and connections to the existing water mains are shown on the Plans. If, during the course of work, unforeseen conditions arise, the location of the pipeline may be changed as directed by the Owner's Representative to meet such conditions. Long radius curves or small angular changes in the pipeline can be formed by deflecting joints of straight pipe not more than 3 degrees to the axis of the pipe.

Only full length gauged pipe may be cut for use in the installation of the water main. When cut all rough edges must be filed to provide a smooth, beveled edge.

The Contractor shall furnish, place, and maintain sheeting and bracing as may be required to securely support the sides and ends of the excavation and to prevent injury to the structure being built or to personal property or adjacent utilities.

Proper tools and facilities satisfactory to the Owner's Representative shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench by means of derricks, ropes, or other suitable tools or equipment, in such a manner to prevent damage to the water main materials and protective coating and lining. Under no circumstances should water main or fitting material be dropped or dumped into the trench.

All pipe and fittings shall be brushed to remove all foreign matter and carefully examined for cracks and other defects while suspended above the trench immediately before installation. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed into the trench.

When pipe installation is not in progress, the open ends of the installed pipe shall be closed by a water tight plug or other means approved by the Owner's Representative.

If water is in the trench, the seal shall remain in place until the trench is pumped dry.

Ends of pipe shall be carefully wiped clean and dry before joining.

The trench shall have a uniform bottom conforming to the grade to which the pipe will be laid and the depth of the bedding material in the area of the pipe shall be in accordance with the dimensions as specified in the Plans. The surface shall be graded smooth to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints.

Joining of pipe shall be in strict accordance of the manufacturer's recommendations. The Contractor shall also furnish and install a concentric reducer with either plain ends and/or mechanical joints as required at the proposed connection points.

In locations where the ductile iron water mains and fittings are installed under roadway or driveway surfaces and when the trench is within 3 feet from the edge of those surfaces, the Contractor shall install bedding and initial backfill material as described in Item 1200 Granular Bedding and Initial Backfill Material.

Restraints shall be installed where called for on the contract drawings and as directed by the Owner's Representative.

Polyethylene Encasement

Polyethylene encasement shall be installed with all new underground ductile iron pipe, fittings, and appurtenances in accordance with ANSI/AWWA C105/A21.5 and these Specifications. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material; however, it is not intended to be completely air tight or watertight enclosure. Lumps of clay, mud, cinders, or other materials that might be on the pipe surface shall be removed prior to installation of the polyethylene encasement

The polyethylene film shall be fitted to the contour of the pipe creating a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene when bridging irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene during backfill operations. Overlaps and ends shall be secured with adhesive tape or plastic straps.

For installation below the water table or in areas subject to water infiltration, tube-form polyethylene shall be used with both ends thoroughly sealed with adhesive tape or plastic tie straps at the joint overlap. Circumferential wraps of tape shall be placed at 2-foot intervals along the barrel of the pipe to minimize the space between the polyethylene wrap and the pipe.

Methods of Installation

Method A - Cut polyethylene tube to a length approximately 2 ft. longer than the pipe section. Slip the tube around the pipe, centering it to provide a 12-in. overlap on each adjacent pipe section and bunching it accordion-fashion lengthwise until it cleared the pipe ends.

Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at the joints to facilitate installation of the polyethylene tube.

After assembling the pipe joint, make the overlap of the polyethylene tube. Pull the bunched polyethylene from the preceding length of pipe, slip it over the end of the new length of pipe, and secure it in place. Slip the end of the polyethylene from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Secure the overlap in place.

Take up the slack width at the top of the pipe to make a snug but not tight fit along the barrel of the pipe, securing the fold at quarter points along the pipe section.

Cuts, tears, punctures, or other damage to the polyethylene shall be repaired immediately.

Method B - Cut polyethylene tube to a length approximately 12-in. shorter than the pipe section. Slip the tube around the pipe, centering it to provide 6-in. of bare pipe at each end. Take up the slack width at the top of the pipe to make a snug but not tight fit along the barrel of the pipe, securing the fold at quarter points along the pipe section.

Before making up a joint, slip a 3-ft. length of polyethylene tube over the end of the preceding pipe section, bunching it accordion-fashion lengthwise. Alternatively, place a 3-ft. length of polyethylene sheet in the trench under the joint to be made. After completing the joint, pull the 3-ft. length of polyethylene over or around the joint, overlapping the polyethylene previously installed on each adjacent section of pipe by at least 12-in. Make each end snug and secure. A shallow bell hole is necessary and shall be made at the joints to facilitate installation of the polyethylene tube or sheet.

Cuts, tears, punctures, or other damage to the polyethylene shall be repaired immediately. Proceed with the installation of the next section of pipe in the same manner.

Pipe-shaped appurtenances - Bends, reducers, offsets, and other pipe-shaped appurtenances shall be covered with polyethylene in the same manner as the pipe.

Odd-shaped appurtenances - When it is not practical to wrap valves, tees, crosses, and other odd-shaped pieces in a tube, wrap with a flat sheet or split length of polyethylene tube by passing the sheet under the appurtenance and bringing the sheet around the body. Make seams by bringing the edges of the polyethylene sheet together, folding them over twice, and taping them. Handle width and overlaps as previously described. Tape the polyethylene securely in place at the valve stem and other penetrations.

Service Connection- Wrap two or three layers of tape completely around the pipe where the tapping machine will be placed. Mount the tapping machine on the taped area and make the tap directly through the tape and polyethylene wrap. Install corporation stop. Inspect the entire area for damage and repair if necessary. Wrap any connected copper service line within three (3) feet of the pipe with polyethylene.

Junctions between Wrapped and Unwrapped Pipe – Where polyethylene wrapped pipe joins an adjacent pipe that is not wrapped, extend the polyethylene wrap to cover the adjacent pipe for a distance of at least 3 ft. Secure the end with circumferential turns of adhesive tape.

Service lines of dissimilar metals shall be wrapped with polyethylene or a suitable dielectric tape for a minimum clear distance of 3 ft. away from the ductile-iron pipe.

Contractor shall backfill carefully to avoid damage to polyethylene encasement. Any damage to the polyethylene encasement shall be repaired immediately.

Backfill and pavement replacement shall be installed as described in Item 1130-Concrete Pavement Replacement, Item 1140-Asphalt Pavement Replacement, Item 1210-Controlled Density Fill (CDF), and Item 1220-Granular Backfill.

The proposed ductile iron water main pipe and fittings shall be installed with a minimum 4 feet cover from finished ground elevation to the top of the water line, unless otherwise noted on the contract drawings or approved by the Owner's Representative.

PART 5 – TESTING

5.1 GENERAL

The **Contractor shall be responsible for all pressure testing and Bacteriological testin**g. Should the pipe line fail either of these tests twice, the contractor shall be responsible to locate and repair the damages section of pipe and to pay the **Village**'s costs for each additional test thereafter.

All testing and disinfection of the water main shall be as specified in the AWWA specifications and shall be inspected and approved in writing by the Village of Mt. Orab Utility Department. All water lines must pass a hydraulic pressure testing of 200 psi or as directed by the Owner's Representative.

5.2 DISINFECTION

The contractor is responsible for providing all Labor, Material, and Equipment necessary to disinfect the complete water pipe line in accordance with AWWA 651 and as directed by the Owner's Representative except as modified herein.

All piping and appurtenances must be properly disinfected with a minimum 50 milligrams per liter total chlorine residual for 48 hours. The piping must then be flushed to remove any excess chlorine. Chlorine solution shall be evenly applied and distributed throughout the piping.

5.3 HYDROSTATIC TESTING

A hydrostatic test as required in Section 5 of the Standard AWWA Specifications C-600 shall be applied to individual valved-off sections of the mains and fire hydrant leads either before or after the trench is backfilled. The pressure during the test shall be maintained at 200 psi, or as directed by the Owner's Representative, in any section being tested. The duration of each pressure test shall be at least two hours. The pump, pipe connection, and all necessary apparatus, except the gauges, shall be furnished by the Contractor. The Owner's Representative will furnish the gauges for the test, but the Contractor shall furnish all necessary assistance for conducting the test.

The Owner's Representative will provide water for testing the water main; however, the Contractor will be responsible for piping or hauling the water, if necessary. Before applying the test pressure, all air shall be expelled from the pipe. The Contractor shall not operate any valves in order to fill the new water main. This shall be done ONLY by the Owner's Representative. The Owner's Representative shall witness all pressure testing.

The following table lists the maximum allowable leakage limits.

ALLOWABLE LEAKAGE PER 1000 FT. OF PIPE (GALLONS PER HOUR)

Test Pressure	Nominal Pipe Diameter (inches)								
psi	2	3	4	6	8	10	12	14	16
200	0.19	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53

Test Pressure	Nominal Pipe Diameter (inches)								
psi	18	20	24	30	36	42	48	54	60
200	1.72	1.91	2.29	2.87	3.44	4.01	4.59	5.16	5.73

Before applying the specified pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made by the Contractor at points of highest elevation, or as required.

In the event that leakage exceeds that shown in the above table, the water main will not be accepted by the District and will require retesting using these same procedures after such time as the necessary corrections have been made to the system.

Leakage shall be defined as the quantity of water that must be supplied to any valved section of newly laid pipe to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Any testing performed against existing valves shall be at the Contractor's risk and in strict compliance with the requirements of the District. Any damage caused to existing facilities as a result of testing shall be repaired at the Contractor's expense.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid per Linear Feet (LF) for Item 2110 – DUCTILE IRON WATER MAIN AND DUCTILE IRON FITTINGS. Progress payments will be made based on the installed linear feet of Item 2110 completed.

END OF SECTION

SECTION 2120 – PVC WATER MAIN AND DUCTILE IRON FITTINGS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for furnishing and installing PVC water main pipe and ductile iron water main fittings as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.2 GENERAL

This work shall consist of providing all labor, materials, and equipment necessary for furnishing and installing PVC water main pipe and ductile iron fittings including all bends, reducers, tees, sleeves and special castings required for the installation of the valves, strapping, placement of concrete thrust blocks and all other work required for furnishing and installing water mains complete and ready for service as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

The water main and fittings shall be installed in accordance with the Contract Drawings, the American Water Works Association (AWWA) for potable water main and fittings installation and the Village of Mt. Orab Utility Department Standard Specifications and Rules and Regulations.

1.3 RELATED WORK

A. Section 1130 Concrete Pavement Replacement
B. Section 1140 Asphalt Pavement Replacement
C. Section 1150 Gravel Driveway Replacement
D. Section 1170 Stream Crossings
E. Section 1180 Keyblock Anchors
F. Section 1190 Jack and Bore with Steel Casing
G. Section 1200 Granular Bedding and Initial Backfill Material
H. Section 1210 Control Density Fill (CDF)
I. Section 1220 Granular Backfill

PART 2 – PRODUCTS

2.1 PVC WATER MAIN

PVC pressure pipe shall be manufactured in accordance with **ASTM D2241 SDR 21**. The outside diameters shall match ductile iron pipe outside diameters. **The wall thickness shall meet the ASTM D2241 requirement(s).**

2.2 DUCTILE IRON FITTINGS

All fittings, wall pipes and specials shall be of ductile iron or in accordance with ANSI A21.10 (AWWA C-153).

All fittings shall have a bituminous coated cement lining complying with AWWA C-104 and shall have an outside coating complying with AWWA C-153 or an epoxy coating complying with AWWA C-116.

All ductile iron fittings shall be provided with and assembled using mechanical joint ends and retainer glands.

2.3 CONCRETE THRUST BLOCKING

Concrete thrust blocking, supports and/or buttresses shall be provided at all tees and bends and at any other locations required by the District. These concrete structures shall be built to the lines, grades and dimensions shown on the Standard Drawings. Concrete used for blocking shall conform to Class C Concrete, having a compressive strength of 4,000 pounds per square inch.

All concrete shall be mixed by mechanical means prior to installation. The installation of dry concrete will not be permitted.

2.4 TRACER WIRE

The tracer wire system shall include THW size 10 AWG copper electrical wire. The boxes shall be equal to Mueller H-10365 roadway screw type valve boxes.

2.5 PIPE JOINT RESTRAINT

Pipe joint restraints shall be RieberLok or approved equal as determined by Owner's Representative, except as modified herein.

All fire hydrant leads and fire hydrant assemblies shall be restrained using Megalug Series 2000PV Mechanical Joint Restraint for AWWA C 900 & C 905 PVC Pipe or approved equal as determined by Owner's Representative.

PART 3 – SUBMITTALS

3.1 PVC WATER MAIN PIPE

Submit literature and/or catalog cut sheets of the PVC water main pipe to be used. Submit to the Owner's Representative for review and approval prior to ordering.

3.2 DUCTILE IRON WATER MAIN FITTINGS

Submit literature and/or catalog cut sheets of the ductile iron water main fittings to be used. Submit to the Owner's Representative for review and approval prior to ordering.

3.3 TRACER WIRE AND LOCATOR TAPE

Submit literature and/or catalog cut sheets of the tracer wire and locator tape to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 GENERAL

The Contractor shall furnish all necessary labor, material, tools, and equipment required in the installation of the water main pipe and fittings. This work includes furnishing all materials, the proper storage of those materials, saw cutting, excavation, laying and joining the pipe, installation of concrete blocking and joint restrains, backfilling, installation of tracer wire and locator tape, repairing or replacing all drains, sewers, utilities, and any other structures that may be disturbed or damaged by the Contractor's operations including driveway culvert pipes, and restoration of all disturbed surfaces, including all pavement restoration. Also included in this item are the disposition of all excavated materials and the chlorination of the pipe line and fittings in place. All work shall be completed as shown on the Contract Drawings and as directed by the Owner's Representative.

Pipe and fittings shall be handled so that the joints, coating and/or lining will not be damaged. If, however, any part of the jointing coating or lining is damaged, the repair or replacement of such material shall be made by the Contractor at his own expense in a manner satisfactory to the Owner's Representative.

All pipe and fittings stored on the job site shall be placed on blocks and suitably chocked to eliminate any possibility of rolling or shifting. Blocks and chocks shall have a minimum thickness of 2 inches and shall be high enough to assure that the pipe and fittings will not be touched by surface drainage.

The Contractor is responsible to repair or replace all pavement and roadway surface disturbed by the contractor, as a result of the water main and fittings installation, to the satisfaction of the governing entity of said pavement or roadway surface.

The Contractor is responsible to notify all affected property owner's prior to all shutdowns per the Village of Mt. Orab Utility Department's Standard Operating Procedures and as directed by the Owner's Representative.

4.2 INSTALLATION

The general proposed location of the water mains and connections to the existing water mains are shown on the Plans. If, during the course of work, unforeseen conditions arise, the location of the pipeline may be changed as directed by the Owner's Representative to meet such conditions. Long

radius curves or small angular changes in the pipeline can be formed by deflecting joints of straight pipe not more than 3 degrees to the axis of the pipe.

When cut all rough edges must be filed to provide a smooth, beveled edge.

The Contractor shall furnish, place, and maintain sheeting and bracing as may be required to securely support the sides and ends of the excavation and to prevent injury to the structure being built or to personal property or adjacent utilities.

Proper tools and facilities satisfactory to the Owner's Representative shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench by means of derricks, ropes, or other suitable tools or equipment, in such a manner to prevent damage to the water main materials and protective coating and lining. Under no circumstances should water main or fitting material be dropped or dumped into the trench.

All pipe and fittings shall be brushed to remove all foreign matter and carefully examined for cracks and other defects while suspended above the trench immediately before installation. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed into the trench.

When pipe installation is not in progress, the open ends of the installed pipe shall be closed by a water tight plug or other means approved by the Owner's Representative.

If water is in the trench, the seal shall remain in place until the trench is pumped dry.

Ends of pipe shall be carefully wiped clean and dry before joining.

All PVC water mains shall include and shall be installed in bedding and initial backfill material as described in Item 1200-Granular Bedding and Initial Backfill Material.

Restraints shall be installed where called for on the contract drawings and as directed by the Owner's Representative.

Backfill and pavement replacement shall be installed as described in Item 1130-Concrete Pavement Replacement, Item 1140-Asphalt Pavement Replacement, Item 1210-Controlled Density Fill (CDF), and Item 1220-Granular Backfill.

The proposed PVC water main pipe and fittings shall be installed with a minimum 4 feet cover from finished ground elevation to the top of the water line, unless otherwise noted on the contract drawings or approved by the Owner's Representative.

4.3 TRACER WIRE

A complete tracer wire system shall be furnished and installed on all PVC pipe used underground. The wire shall be continuously wrapped around the entire length of the PVC pipe, shall be THW size 10 AWG copper electrical wire, and shall terminate and be looped through location boxes at 400 foot intervals. Sufficient wire shall be looped in the location boxes that the wire can extend to above the boxes. The boxes shall be equal to Mueller H-10365 roadway screw type valve boxes. In addition, locator tape properly installed 12" above the pipe is required with proper backfill.

PART 5 – TESTING

5.1 GENERAL

The **Contractor shall be responsible for all pressure testing and Bacteriological testin**g. Should the pipe line fail either of these tests twice, the contractor is shall be responsible to locate and repair the damages section of pipe and to pay the County's costs for each additional test thereafter.

All testing and disinfection of the water main shall be as specified in the AWWA specifications and shall be inspected and approved in writing by the Village of Mt. Orab Utility Department. All water lines must pass a hydraulic pressure testing of 200 psi or as directed by the Owner's Representative.

5.2 DISINFECTION

The contractor is responsible for providing all Labor, Material, and Equipment necessary to disinfect the complete water pipe line in accordance with AWWA 651 and as directed by the Owner's Representative except as modified herein.

All piping and appurtenances must be properly disinfected with a minimum 50 milligrams per liter total chlorine residual for 48 hours. The piping must then be flushed to remove any excess chlorine. Chlorine solution shall be evenly applied and distributed throughout the piping.

5.3 HYDROSTATIC TESTING

A hydrostatic test as required in Section 10 of the Standard AWWA Specifications C-605 shall be applied to individual valved-off sections of the mains and fire hydrant leads either before or after the trench is backfilled. The pressure during the test shall be maintained at 200 psi, or as directed by the Owner's Representative, in any section being tested. The duration of each pressure test shall be at least two hours. The pump, pipe connection, and all necessary apparatus, except the gauges, shall be furnished by the Contractor. The Owner's Representative will furnish the gauges for the test, but the Contractor shall furnish all necessary assistance for conducting the test.

The Owner's Representative will provide water for testing the water main; however, the Contractor will be responsible for piping or hauling the water, if necessary. Before applying the test pressure, all air shall be expelled from the pipe. The Contractor shall not operate any valves in order to fill the new water main. This shall be done ONLY by the Owner's Representative. The Owner's Representative shall witness all pressure testing.

The following table lists the maximum allowable leakage limits.

ALLOWABLE LEAKAGE PER 1000 FT. OF PIPE (GALLONS PER HOUR)

Test Pressure	Nominal Pipe Diameter (inches)								
psi	2	3	4	6	8	10	12	14	16
200	0.19	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53

Test Pressure	Nominal Pipe Diameter (inches)								
psi	18	20	24	30	36	42	48	54	60
200	1.72	1.91	2.29	2.87	3.44	4.01	4.59	5.16	5.73

Before applying the specified pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made by the Contractor at points of highest elevation, or as required.

In the event that leakage exceeds that shown in the above table, the water main will not be accepted by the District and will require retesting using these same procedures after such time as the necessary corrections have been made to the system.

Leakage shall be defined as the quantity of water that must be supplied to any valved section of newly laid pipe to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Any testing performed against existing valves shall be at the Contractor's risk and in strict compliance with the requirements of the District. Any damage caused to existing facilities as a result of testing shall be repaired at the Contractor's expense.

The Village of Mt. Orab Utility Department is responsible for the first hydraulic pressure and Bacteriological testing. Should the pipe line fail either of these tests, the contractor is responsible to locate and repair the damaged section of pipe and to pay the County's costs for each additional test thereafter.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid per Linear Feet (LF) for Item 2120 – PVC WATER MAIN AND DUCTILE IRON FITTINGS. Progress payments will be made based on the installed linear feet of Item 2120 completed.

END OF SECTION

SECTION 2210 – GATE VALVES

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Materials, and Equipment necessary for furnishing and installing new gate valves and valve boxes, as shown on the Contract Drawings or as directed by the Owner's Representative.

1.2 RELATED WORK

A. Section 2110 – Ductile Iron Water Main and Ductile Iron Fittings
B. Section 2120 – PVC Water Main and Ductile Iron Fittings

PART 2 – PRODUCTS

2.1 GATE VALVES

All new valves 12-inches and larger shall be butterfly valves as described in Section 2220 – Butterfly Valves.

All new gate valves shall conform to AWWA C-509 or C-515 except as modified herein.

New gate valves shall be fully encapsulated resilient wedge, non-rising stem, left hand open (counter clockwise), and shall have rubber "O"-ring, packing seals and mechanical joint ends with a 250 psi pressure rating, unless otherwise approved by the Owner's Representative. The internal valve coating shall be in accordance with AWWA-C550.

Where flanged joint ends are specified, they shall conform to requirements of AWWA C-515 and shall include all bolts, nuts and full-face rubber gaskets.

Approved models are: American Flow Control Series 2500, Mueller 2362, US Pipe A-USP2, M&H 4067, M&H 7000, Kennedy KS-RW, and Clow Model 2638.

2.2 VALVE BOXES

Valve boxes shall be equal to F-2450 Series as manufactured by Clow Corp or Sigma Corporation VB261-8. Valve box assembly shall be of cast iron with stay put cover and properly sized base for the valve being fitted. Covers shall be marked "WATER". All boxes shall be furnished with the necessary extensions to bring the top of the box to the finished grade. Valve box includes a gate box aligner manufactured by PosiCap or approved equal.

PART 3 – SUBMITTALS

Submit literature and/or catalog cut sheets for all new gates valves, valve boxes, and tapping valves, to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Install all gate valves and valve boxes as called for on the contract drawings, as detailed in the Village of Mt. Orab standard drawings and as directed by the Owner's Representative.

All valve boxes shall be installed such that they are centered vertically over the valve operating nut and such that the box provides maximum cover of the operating housing.

The operating nut shall be installed between 24 and 60 inches below grade. Contractor shall provide extension, if necessary to complete installation.

PART 5 – TESTING

New valves shall be included in the testing of the new water main as described in Section 2110 – Ductile Iron Water Main and Ductile Iron Fittings or Section 2120 - PVC Water Main and Ductile Iron Fittings.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
2210	Each (Ea.)	Gate Valve & Valve Box

END OF SECTION

SECTION 2220 – BUTTERFLY VALVES

PART 1 – GENERAL

1.1 GENERAL

Provide all Labor, Material, and Equipment necessary for furnishing and installing new butterfly valves and valve boxes, as shown on the Contract Drawings or as directed by the Owner's Representative.

1.2 RELATED WORK

A. Section 2110 – Ductile Iron Water Main and Ductile Iron Fittings
B. Section 2120 – PVC Water Main and Ductile Iron Fittings

PART 2 – PRODUCTS

2.1 BUTTERFLY VALVES

New valves less than 12-inches shall be gate valves as described in Section 2210-Gate Valves.

Install all butterfly valves and valve boxes as called for on the contract drawings, as detailed in the Village of Mt. Orab standard drawings and as directed by the Owner's Representative.

Butterfly valves shall conform to the AWWA Standard Specification for Rubber Seated Butterfly Valves; Designation AWWA C-504 of latest revision except as modified herein. Valves shall be suitable for flow in either direction and shall be bubble tight in either direction. Wafer valves shall not be acceptable. Internal valve coating should be in accordance with AWWA-C550.

Valves shall be AWWA Class 250B designed for 250 psi non-shock shut-off pressure. Valves and appurtenances, including operators, shall be cast iron suitable for buried and submerged service.

Valves for use with ductile iron pipe shall have mechanical joint ends furnished with high strength cast iron tee head bolts and hex nuts, and rubber gaskets.

Bodies shall be cast iron conforming to ASTM A126, Class B or ASTM A48, Class 40 or ductile iron conforming to ASTM A536 Grade 65-45-12 or 70-50-05.

Unless otherwise approved, shafts shall be stainless steel, ASTM A276, Type 304, or ASTM A564, Type 630, or monel, turned, ground and polished. Shafts shall be secured to the valve disc by a process such as bolting, riveting, threading, upsetting, or cross-pinning, using corrosion-resistant metals. Chemical bonding, adhesives, or welding shall not be used.

Valves shall be designed to seat at 90 degrees to the pipe axis and shall be constructed of corrosion-resistant materials.

Seats shall be of a rubber compound complying with the requirements of AWWA C-504. Rubber seats shall be on the body.

Operators suitable for buried and submerged service shall be furnished with each valve. Operators shall be designed to produce the specified output torque with a maximum input torque of 150 foot-pounds applied to the operating nut. Operators shall be traveling nut type.

The total number of turns applied to the wrench nut required to completely open (close) the valve from completely closed (open) position shall be not less than twice the nominal valve diameter in inches for valves less than 16 inches in diameter and shall be not less than 30 turns for 16 inch and larger valves. All operators shall be for left-hand (counter clockwise) opening.

Approved Butterfly Valves are: DeZurik-250B, Mueller Lineseal XPII-250B, Henry Pratt Company-Model HP250II, and Kennedy Class 250B.

2.2 VALVE BOXES

Valve boxes shall be equal to F-2450 Series as manufactured by Clow Corp or Sigma Corporation VB261-8. Valve box assembly shall be of cast iron with stay put cover and properly sized base for the valve being fitted. Covers shall be marked "WATER". All boxes shall be furnished with the necessary extensions to bring the top of the box to the finished grade. Valve box includes a gate box aligner manufactured by PosiCap or approved equal.

PART 3 – SUBMITTALS

Submit literature and/or catalog cut sheets of the butterfly valve and valve box to be used. Submit to the Owner’s Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Install all butterfly valves and valve boxes as called for on the contract drawings and as directed by the Owner’s Representative.

All valve boxes shall be installed such that they are centered vertically over the valve operating nut and such that the box provides maximum cover of the operating housing.

If the top of the operating nut is more than 60 inches below the finished grade, an extension stem shall be provided and installed to locate the operating stem nut between 24 inches and 36 inches below the finished grade.

PART 5 – TESTING

New valves shall be included in the testing of the new water main as described in Section 2110 – Ductile Iron Water Main and Ductile Iron Fittings or Section 2120 - PVC Water Main and Ductile Iron Fittings.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
2220	Each (Ea.)	Butterfly Valve & Valve Box

END OF SECTION

SECTION 2230 – ISOLATION/ACCESS VALVE AND MANHOLE

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for furnishing and installing an isolation/access valve and manhole as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.2 RELATED WORK

A. General Specification: Section 2110 Ductile Iron Water Main and Ductile Iron Fittings
B. General Specification: Section 2120 PVC Water Main and Ductile Iron Fittings
C. General Specification: Section 2210 Gate Valves
D. General Specification: Section 2220 Butterfly Valves

PART 2 – PRODUCTS

2.1 VALVES

Valves shall conform to Section 2210 and 2220 of these specifications.

2.2 CORPORATION STOP

Approved corporation stops are:

- 1" – Ford F1000-3-G-NL
- 2" – Ford FB-1000-7-G with a tapping saddle.

2.3 TAPPING SADDLE

Approved tapping saddles are Ford 202-BS with stainless steel strap and brass body with CC thread outlet.

2.4 ACCESS MANHOLE

This item shall consist of constructing a precast concrete access manhole, as shown in the Standard Detail Drawings, for the proposed water main at the locations shown on the plans. Access manholes shall rest on a concrete ring footing made of 4000 psi class C concrete. Within the footing 6" of aggregate base #57 stone shall be placed. The precast concrete flat slab top shall be reinforced for highway loadings.

2.5 MANHOLE FRAME AND LID

The manhole frame shall be a Neenah Type R1775 or East Jordan 2045. The lid shall be a self sealing

Neenah Type R1664 or East Jordan 2045. Lid must be stamped WATER.

PART 3 – SUBMITTALS

Submit literature and/or catalog cut sheets of the valves, corporation stops, tapping saddles, access manhole, and manhole frame and lid to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

All isolation/access valves and manholes shall be installed as shown on the Standard Drawings specified herein, complete and ready for operation.

Valves shall be installed per manufacturer's recommendations with proper tools and equipment.

Corporation stop shall be installed per manufacturer's recommendations with proper tools and equipment. Care should be taken to use the proper drill bit when tapping the water main to correspond to the material that the main is made of. Corporation stop shall be installed at the top of the pipe at the 12 o'clock position.

Manhole frame and lid shall be installed so that valve operator is accessible from above.

PART 5 – TESTING

All testing will be performed in conjunction with the water main as stated in Sections 2110 and 2120.

PART 6 – BASIS OF PAYMENT

6.1 ISOLATION/ACCESS VALVE AND MANHOLE

Payment for all labor, material, and equipment necessary to install isolation/access valve shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
2230	Each	Isolation/access valve and manhole complete

END OF SECTION

SECTION 2240 – TAPPING SLEEVE AND VALVE

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for furnishing and installing a tapping sleeve and valve as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.1 RELATED WORK

- **A.** General Specification: Section 2210 Gate Valves
- **B.** General Specification: Section 2110 Ductile Iron Water Main and Ductile Iron Fittings
- **C.** General Specification: Section 2120 PVC Water Main and Ductile Iron Fittings

PART 2 – PRODUCTS

2.1 TAPPING VALVE

The tapping valves shall meet the requirements for gate valves under Section 2210 of these specifications except as modified herein. One end shall be flanged, for connecting to the tapping sleeve and the other shall be mechanical joint. The body shall be modified to accept the tapping machine.

Approved Tapping Valves are: Mueller 2360, US Pipe MetroSeal 250, or M&H 4751

2.2 TAPPING SLEEVE

The tapping sleeve shall meet the requirements of ANSI/NSF 61. The body shall be made of iron with 3/4" NPT test plug. The sleeve shall be a split fitting which can be assembled around an existing main. Tapping sleeves shall have a working pressure of 250 psi for pipe 4" – 12" and 200 psi for pipe larger than 12".

Approved Tapping Sleeves are: Mueller H-615, US Pipe T-9, or M&H 1574

2.3 VALVE BOX

Valve boxes shall be equal to F-2450 Series as manufactured by Clow Corp. Valve box assembly shall be of cast iron with stay put cover and properly sized base for the valve being fitted. Covers shall be marked "WATER". All boxes shall be furnished with the necessary extensions to bring the top of the box to the finished grade.

PART 3 – SUBMITTALS

Submit literature and/or catalog cut sheets of the tapping valve, tapping sleeve, and valve box to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 EXCAVATION

The Contractor shall make the excavation of sufficient size to allow the tapping machine and crew room to perform the tap.

4.2 TAPPING SLEEVE AND VALVE INSTALLATION

Before assembly of the tapping sleeve and valve, the Contractor shall clean the existing pipe thoroughly to provide a smooth, hard surface for the gasket of the tapping sleeve. The Contractor shall verify the pipe type and outside diameter dimension.

Tapping sleeves (outside sleeve edge) shall not be installed within 2 feet of a pipe joint/fitting of an existing main, tapping sleeve or tapped corp.

Tapping sleeve and valve shall be installed in accordance with the manufacturer's recommendations. Valves and sleeves shall be properly installed onto the existing pipe and the openings cut on the existing pipe under pressure. The face of the outlet flange shall be plumb. The tapping valve shall be bolted securely to the tapping sleeve outlet flange and rest on concrete blocking. Any leak in the installation shall be corrected as approved by the Owner's Representative.

4.3 TAPPING OF MAIN

The use of a shell type cutter with pilot drill shall be required. Whenever tapping a potable water main, the shell cutter shall be disinfected with straight bleach or super-chlorinated solution prior to start of tapping operation. The shell cutter shall be of the size required to cut full opening.

Only qualified operators shall operate the tapping machine. The "coupon" shall be withdrawn and be given to the Owner's Representative for inspection and storage.

PART 5 – TESTING

The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, injection booster pump, test pressure gauge, ductile iron MJ plug and a water source for testing the tapping sleeve and valve.

After installing the tapping sleeve and valve, and prior to tapping of a pressurized main/line, a hydrostatic and leakage test shall be performed. The Contractor shall install an MJ plug on the tapping valve and conduct the specified test with the valve in the open position. The tapping sleeve with valve in the open position shall be capable of maintaining a test pressure of 200 psi for a 20 minute duration, with no sign of pressure loss.

PART 6 – BASIS OF PAYMENT

Payment for all labor, material, and equipment necessary to install a tapping sleeve and valve shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
2240	Each	Tapping sleeve and valve

END OF SECTION

SECTION 2300 – FIRE HYDRANT ASSEMBLY, COMPLETE

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for furnishing and installing a fire hydrant assembly as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.2 RELATED WORK

- **A.** General Specification: Section 2210 Gate Valves
- **B.** General Specification: Section 2110 Ductile Iron Water Main and Ductile Iron Fittings
- **C.** General Specification: Section 2120 PVC Water Main and Ductile Iron Fittings

PART 2 – PRODUCTS

2.1 FIRE HYDRANT

The hydrants shall conform to AWWA Specifications C-502 except as modified herein.

The hydrants shall be dry top design with two (2) 2-1/2-inch hose nozzles having 3-1/16-inch O.D. x 7-1/2 threads per inch (National Standard Thread (NST), one (1) 4-inch pumper connection with integral Storz connection, and a 6-inch mechanical joint shoe connection. A sealed oil or grease reservoir shall be provided, with oil or grease filled at the factory. O-ring seals shall be included to provide positive water and lubricant sealing with no packing adjustments or stem binding. The hydrants shall be equipped with breakable safety flange (or breakable bolts) and stem couplings. The main valve shall be 5-1/4-inch compression type, shall close with water pressure and shall incorporate a double drain valve to drain the hydrant when not in use. The hydrant shall be low profile type extending approximately 27 to 32 inches above the ground. The outlets shall have caps with chains and National Standard Threads. The operating nut shall be a standard 1-1/2-inch pentagon, open left. Hydrants shall be draining type.

The maximum head loss of the hydrant through a 4-inch outlet shall be 4.0 psi at 1,000 gallons per minute.

Each standpipe of all new hydrants shall be painted with a prime (shop) coat and an enameled finish coat above ground and two shop coats of asphalt varnish below ground. Enamel finish coat color shall be factory applied International Harvester Red.

2.2 6" GATE VALVE

Gate Valves shall conform to Section 2210 of these specifications.

2.3 6" DUCTILE IRON PIPE

Ductile Iron Pipe shall conform to Section 2110 of these specifications.

2.4 MECHANICAL JOINT RESTRAINT

Mechanical Joint Restraint shall conform to Section 2110 of these specifications.

2.5 FIRE DEPARTMENT CONNECTION

Fire Department Connection shall be as per the typical detail and the direction of the Village of Mt. Orab Fire Department.

PART 3 – SUBMITTALS

Submit literature and/or catalog cut sheets of the fire hydrant, gate valve, pipe, and mechanical joint restraint to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

All fire hydrant assemblies shall be installed using ductile iron pipe, mechanical joint restraint, and blocking as shown on the Standard Drawings specified herein, complete and ready for operation. Anchor Tees may be approved on a case-by-case basis by the Village.

Unless otherwise approved by the Village, fire hydrants shall be located one (1) foot outside the road right- of-way, inside a 15'x15' permanent easement, as shown on the plans. They shall be of proper length to suit the depth of cover over the water lines at the locations to be installed. Fire hydrants shall be located to clear driveway openings by a minimum of five (5) feet.

The pit or trench for the fire hydrant shall be so excavated that when the hydrant is installed, the base shall rest on blocking and the hydrant shall be set plumb with nozzle outlet approximately 18 inches from ground line. Hydrants shall be set in accordance with grade line which is approximately 2 inches below bottom of break connection on the hydrant standpipe.

Hydrants shall be set plumb with a minimum of 4.0 foot bury unless otherwise noted and with nozzles parallel with or at right angles to the street. The pumper nozzle shall face the street.

Washed granular material shall be used as bedding and backfill below and around the fire hydrant as shown on the Standard Detail.

Inspections of all fire hydrants and related appurtenances shall be performed by the Utility Department.

PART 5 – TESTING

All testing will be performed in conjunction with the water main as stated in Sections 2110 and 2120.

PART 6 – BASIS OF PAYMENT

Payment for all labor, material, and equipment necessary to install fire hydrant assembly shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
2300	Each	Fire Hydrant Assembly, Complete

END OF SECTION

SECTION 2400 – WATER SERVICE, FITTINGS, AND METER SETTING (SINGLE, DOMESTIC SERVICE 2" AND SMALLER)

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary to furnish and install, replace, reconnect and/or relocate, all Single, Domestic 2" and smaller water services, fittings, and meters shown on the plans and/or specified herein, except where noted in this specification. This item includes the Labor, Material, and Equipment necessary to tap the water main, extend the water service onto the Customer's property, install the meter and other necessary equipment, and extend the service line a distance of three (3) to four (4) feet past the meter chamber. In cases of reconnection, replacement or relocation, this item includes Material, Labor, and Equipment necessary to reconnect to the Customer's existing service line.

1.2 EXISTING WATER MAIN CUSTOMER CONNECTIONS

For an individual new customer connection to an existing water main, all work described above is performed by the **Village of Mt. Orab Utility Department.**

1.3 NEW SUBDIVISION / NEW MAIN EXTENSION CUSTOMER CONNECTIONS

For new service connections associated with new subdivisions and new main extensions, all work described above is performed by the CONTRACTOR, except the new water meter, **setter**, and gaskets shall be provided and installed by the **Village of Mt. Orab Utility Department.**

1.4 EXISTING SERVICE RELOCATION/RE-ESTABLISHMENT

For relocations and/or re-connection of existing service connections, all work described above is performed by the CONTRACTOR. The existing water meter shall be reused for this work.

1.5 RELATED WORK

A. Section 1200 Granular Bedding and Initial Backfill Material
B. Section 1210 Controlled Density Fill (CDF)
C. Section 1220 Aggregate Backfill & Base Material

PART 2 – PRODUCTS

All products that will contact potable water once incorporated in the project must meet or exceed all applicable AWWA rules and regulations.

2.1 TAPPING SADDLE

Tapping saddles for connections 2" and smaller to C-900 PVC shall be manufactured from the Ford Meter Box Company style **Ford VBH72-12W-33-NL** brass body with CC thread outlet, or approved equal.

2.2 CORPORATION STOP

Approved Corporation Stops shall be:

¾" – Ford Meter Box Company F1000-3-G-NL
1" – Ford Meter Box Company F1000-4-G-NL
1 ½" – Ford Meter Box Company FB1000-6-G-NL
2" – Ford Meter Box Company FB1000-7-G-NL

2.3 2" AND SMALLER SERVICE LINE

Water service lines, which extend from the water main to 3' beyond the meter, shall be Copper Tube Sizes (CTS) conforming to ASTM B-88 Specifications. All water service lines shall have a minimum bury depth of 42" at final, finished grade.

2.4 METER BOX

Meter boxes shall be:

¾" meter – 18" Tile
1" meter – 18" Tile
1 ½" and 2" – 36" Tile

*See Standard Drawing W3.3.1 for additional detail.

2.45 METER BOX CASTING & LID

5/8"X3/4" and 1" meter settings – Vestal RMR-20 Recessed Fram and Nicor, Inc. 12.25" Type A, Non-Metallic Lid with Sensus Recess and Thru Hole, or approved equal.

1 ½" and 2" meter settings – Vestal Expander Ring – Model ER-2030, Vestal 32-055 Monitor Ring, and Vestal 20" Monitor Cover w/ TR & SN, or approved equal.

2.5 METERS

All meters used in the Village of Mt. Orab Utility Department distribution system must be purchased from and installed by the Utility Department and shall be installed according to the Village of Mt. Orab Utility Department Standard Drawings. Where existing water services are being relocated or reconnected, the existing water meter shall be re-used.

2.6 ANGLE VALVES (*Note: only to be used under Special Circumstance(s) per Village Utility Dept.)

Angle Valves for 5/8" x ¾" and 1" water meters shall be in accordance with the following schedule and installed according to the Village of Mt. Orab Utility Department Standard Drawings:

Meter Size	Inlet	Outlet
5/8" x ¾"	Ball Valve (3/4" MIPT x MIPT)	Single Check Valve (3/4" MIPT x MIPT)
1"	Ball Valve (3/4" MIPT x MIPT)	Single Check Valve (3/4" MIPT x MIPT)

Provided the existing meter setting is re-installed in the exact same location, the existing water meter, **meter seter** shall be re-used and re-installed by the CONTRACTOR.

2.6.5 METER SETTERS (*Note: to primarily be used per Village Utility Dept.)

Meter Setters for 5/8"x3/4" and 1" water meters shall be in accordance with the following schedule and installed according to the Village of Mt. Orab Utility Department Standard Drawings:

Meter Size	Meter Setter
5/8" x ¾"	Ford VBH72-12W-33-NL
1"	Ford VBH72-12W-44-44-NL

*See Standard Drawing W3.2.0 for additional detail.

2.7 1 ½" AND 2" DOMESTIC CUSTOM METER ASSEMBLY

Meter Assemblies for 1 ½" and 2" Domestic Meters shall be in accordance with the following schedule and installed according to Clermont County Water Resources Department Standard Drawings:

Meter Size	Complete Assembly
1 ½"	Ford VH76-18-11-66-G-NL
2"	Ford VH77-18-11-77-G-NL

Provided the existing meter setting is re-installed in the exact same location, the existing water meter shall be re-used and re-installed by the CONTRACTOR.

2.8 COMPRESSION FITTINGS

Compression Fittings used for relocated and reconnected water meters shall be Ford Grip Joint Coupling (C44-xx-G-NL style), Ford Pack Joint Coupling (C44-xx-NL style), or approved equal.
New water service lines – Couplings on new service line between the water main and the meter are prohibited, unless approval from the Owner's Representative is received.

PART 3 – SUBMITTALS

3.1 MATERIALS AND FITTINGS

Submit literature and/or catalog cut sheets of all material and fittings to be used associated with the installation of 2" and smaller single, domestic water services. Submit to the Owner's Representative for review and approval prior to ordering.

3.2 TRENCHLESS WATER SERVICE INSTALLATION METHOD

Submit literature detailing the construction method to be used to provide trenchless installation of water services for review and approval. Trenchless service line installation is required for all services crossing existing public roadways/right of ways.

PART 4 – EXECUTION

4.1 GENERAL

Water service connection shall be made only after the water main has passed all pressure and bacteria testing and has been approved for connections by the OWNER'S REPRESENTATIVE. The CONTRACTOR is responsible to notify, in writing, all affected customers 48 hours in advance of any disruption in water service. Water service connections shall be performed in accordance with these specifications and the **Village of Mt. Orab Utility** Department Standard Drawings.

The CONTRACTOR shall install a 2-inch by 2-inch by 6-feet pole, painted with two (2) coats of blue paint and a 5' long rebar (installed vertically) at the proposed location of the angle valve / water meter pit. The location of the pole and rebar shall be maintained, by the CONTRACTOR, until the final grade is established and the water meter is installed.

The CONTRACTOR shall stamp the roadway curb with a "W" indicating the location of the water service line.

4.2 SERVICE LINE INSTALLATION METHOD

It is the CONTRACTOR'S option to install the water service line prior to or following the roadway installation.

Water service installation shall be by open cut, direction drill or trenchless "mole" method. All excavations shall remain open and available for inspector review and approval. All water service lines shall have a minimum bury depth of 42" after final grade is established.

The CONTRACTOR is responsible to follow all right of way permits, where applicable.

4.3 TAPPING THE WATER MAIN

The tap to the water main will be performed while the main is under pressure, so that water main and any existing services are not interrupted. Care should be taken to use the proper drill bit when tapping the water main to correspond to the material that the main is made of. Taps shall be made at least three (3) feet from any bell, fitting or other tap. The water main shall be tapped at a 45 degree angle from vertical. The Village of Mt. Orab Utility Department makes all taps for new services.

Following completion of the tapping of the water main, the CONTRACTOR shall poly wrap the water main and service line as outline in the General Specifications, Section 2110 – Ductile Iron Water Main & Ductile Iron Fittings.

For ductile iron water main, service taps shall be made directly to the main. For PVC water main, service taps shall be completed using an approved tapping saddle (Ford Pivoting Brass Saddle (Series S70) with copper connection (CC) thread).

4.4 CONNECTING TO EXISTING WATER SERVICE LINE, INSTALLATION OF FITTINGS

The CONTRACTOR will be responsible to freeze service lines to make connections. CRIMPING IS NOT PERMITTED on new, existing, or abandoned water service lines. Abandoned water service lines shall be made water tight with a pack joint valve or cap. All service branches shall remain in service until the new tap connection is in place. The CONTRACTOR shall freeze the existing service branch at the point where the reconnection is to the new service branch is to be made. Care should be taken to protect that portion of the existing service line that is to remain in service. All new service lines shall be installed with a minimum 42" of cover and backfilled with clean, native soil free of rock and debris. All new service lines will be of a single piece of copper, with fittings only at the point of connection at the meter.

The CONTRACTOR must exercise care when installing and reconnecting the new service line and fittings to avoid contamination from surrounding soils and ground water. Prior to reconnecting the Customer's water service, the CONTRACTOR should adequately flush the line to remove any debris that may have entered.

4.5 LOCATION OF WATER METER

All water meters are to be installed one (1) foot outside the right-of-way or easement line in a grassy, non-paved, area. All water meters are to be located within the property lines of the property served, unless the property is served via an easement in accordance with Article 5.4 of the Clermont County Water Resources Department Rules and Regulations. The Contractor shall adjust meter pits to finished grade, using approved, factory made adjusting rings. A "pigtail" of service line shall extend three (3) to four (4) feet beyond the meter pit.

4.6 RELOCATED WATER METERS

Where indicated on the construction drawings or directed by the OWNER'S REPRESENTATIVE, the CONTRACTOR shall relocate existing water meters. The CONTRACTOR shall re-use the existing water meter box, lid, and frame. In cases where the meter box is constructed of fiber board, or directed by the OWNER'S REPRESENTATIVE, the CONTRACTOR shall supply and install a new meter box and re-use the existing lid and frame. In all cases, the CONTRACTOR shall re-use the existing Meter. Relocated water meters will include replacement of Compression Fittings, Custom Meter Assembly, and Compression Fittings as specified in Parts 2.6, 2.7, and 2.8 of this Specification.

4.7 GROUND ELEVATION ADJUSTMENTS

In locations where the existing surface elevation at the water meter setting is altered, the water meter setting including the meter and service lines into and out of the meter setting, shall be adjusted such that the service lines are set at a cover of 42". The water meter shall be located as shown on Standard Detail W 3.4. The **meter setter** will be installed such that the meter, once installed, will be 18" below the meter pit cover.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

6.1 WATER SERVICE, FITTINGS, AND METER SETTING (SINGLE, DOMESTIC SERVICE 2" AND SMALLER)

Payment for all Labor, Material, and Equipment necessary to furnish and install, replace, reconnect, and/or relocate, all Single, Domestic 2" and smaller water services, fittings, and meters shown on the plans and/or specified herein. This item includes the Labor, Material, and Equipment necessary to tap the water main, extend the water service onto the Customer's property, install the meter and other necessary equipment, and extend the service line a distance of 3 feet past the meter chamber and reconnect to the Customer's existing service line. Payment shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
2400	Each (EA)	New Water Service & Setting, Complete
2400	Each (EA)	Type I & II Water Service/Meter, Reconnection Includes all fittings
2400	Each (EA)	Type III Water Service/Meter, Relocation and Reconnection; Includes all fittings
2400	Each (EA)	3/4” Meter Box
2400	Lineal Feet (LF)	3/4” CTS Copper Service Line
2400	Lineal Feet (LF)	1” CTS Copper Service Line
2400	Lineal Feet (LF)	2” CTS Copper Service Line

Payment for all CTS Copper Service Line will be for water service line actually installed, as measured by the OWNER’S REPRESENTATIVE. Payment will not be made for wasted or scrapped copper service line.

END OF SECTION

SECTION 2420 – WATER SERVICE, FITTINGS, 3" AND LARGER, AND DUAL SERVICE 2" AND SMALLER

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to tap the water main and install the water service line to the water system chamber on the customer's property and extend the service line(s) three feet past the chamber.

PART 2 – PRODUCTS

2.1 TAPPING SLEEVES

Approved tapping sleeves shall conform to Section 2240.

2.2 WATER SERVICE LINE MATERIAL

Water service line, 3" and larger, material shall be SDR 21 PVC conforming to Section 2110. Dual service lines, 2" and smaller, shall conform to Section 2400.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of the materials to be used for review & approval by the Owners Representative prior to ordering.

PART 4 – EXECUTION

4.1 TAPPING THE WATER MAIN

Taps shall be made by the Contractor in accordance with the standard drawings and Section 2240.

PART 5 – TESTING

5.1 GENERAL

Testing is required for water service lines, 3" and larger, that serve water chambers for all extensions more than 20 feet in length.

If required, testing shall be in accordance with Section 2110.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Lineal Feet (LF) price bid for Item 2420 – WATER SERVICE, FITTINGS, 3" AND LARGER, AND DUAL SERVICE 2" AND SMALLER. Progress payments will be made based on the measured quantities of Item 2420 completed. The Contractor shall review the submitted units completed and provide confirmation to the Owners Representative of the measurements prior to payment for work under this specification.

END OF SECTION

SECTION 2425 – WATER SYSTEM CHAMBER

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to install the chamber, meter, detector check or double check valve and appurtenances.

PART 2 – PRODUCTS

2.1 WATER CHAMBER

Water chambers for 3" and larger and dual service branch setting consist of the enclosure which houses meter, detector check or double check valve and appurtenances. All meters used in the Village of Mt. Orab Utility Department distribution system must be purchased from the Utility Department.

Concrete used for the chambers shall be 4,000 psi compressive strength class C. Reinforcing steel shall conform to ASTM 615 for grade 60 steel. Water stops shall be made of extruded or molded polyvinyl chloride and shall be 6 inch, type 4c as manufactured by W.R. Grace and Company or equal.

Manhole frame and covers shall be equal to Halliday Products Model No. S1R024024 or S2R024048 Aluminum with recessed lift handle(s), stainless steel hardware, stainless steel and aluminum hold open arm(s), and stainless steel slam lock with key or approved equal. Features include 300 psi load rating, ¼" aluminum diamond plate cover and ¼" aluminum frame.

Mechanically expandable link type rubber seals shall be installed where shown on the standard drawings and as called for herein. All pipe lines which pass through walls shall be sealed. Such seals shall fill the annular space between the pipe and the cored hole through with the pipe passes. In general, one seal shall be provided at each such annular opening, flush with the inner face of the wall. All metal parts of the seals shall be 300 series stainless steel. Links shall be EPDM rubber, pressure plates shall be delrin. The seals shall provide air and water tightness as well as electrical insulation between the pipe and the wall opening. Seals shall be watertight to 40 feet of head.

A fabricated aluminum ladder shall be furnished and permanently installed in the chamber according to the Utility Department Standard Drawings.

All coring of holes for passage of pipe lines shall be included in this item.

The chamber shall be provided with adequate drainage to a storm sewer or natural channel **via floor drains where applicable** as approved by the Owner's Representative. Where this is not possible, a **submersible pump shall be permanently installed**, and located and sized as shown on the standard drawings. The floor drain shall be equal to Josam 32226 with 6 inch outlet size and sediment bucket and

located as shown on the Utility Department Standard Drawings.

The dimensions and arrangements shall be installed according to the Utility Department Standard Drawings.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of the materials to be used for review & approval by the Owners Representative prior to ordering.

PART 4 – EXECUTION

4.1 LOCATION OF WATER CHAMBER

Water system chambers shall be located entirely on the customer's property at the edge of the road right-of-way or easement. They should be located as close to the water main as possible and in an unpaved, grassy area.

PART 5 – TESTING (none)

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Each (EA) price bid for Item 2425 – WATER SERVICE CHAMBER. Progress payments will be made based on the measured quantities of Item 2425 completed. The Contractor shall review the submitted units completed and provide confirmation to the Owners Representative of the measurements prior to payment for work under this specification.

END OF SECTION

SECTION 2430 – TESTING/SAMPLING TAPS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to install the corporation stops specified herein.

PART 2 – PRODUCTS

2.1 CORPORATION STOPS

Only 2" taps and tapping saddles per Section 2400 of this standard will be used.

Approved 2" corporation stops are **Ford VH77-18-11-77-G-NL** with a saddle strap.

Fittings shall be compression-style for CTS tubing, Ford "Pack Joint", A.Y. McDonald "Mac-Pak" or approved equal. Couplings with set screws or grip rings will not be acceptable.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of the materials to be used for review & approval by the Owners Representative prior to ordering.

PART 4 – EXECUTION

4.1 LOCATION OF CORPORATION STOPS

As directed by the Owner's Representative for adequate testing.

4.2 ABANDONMENT

Contractor shall remove copper and leave the corporation stop in the off position.

PART 5 – TESTING (none)

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Each (EA) price bid for Item 2430 – TESTING/SAMPLING TAPS. Progress payments will be

made based on the measured quantities of Item 2430 completed. The Contractor shall review the submitted units completed and provide confirmation to the Owner's Representative of the measurements prior to payment for work under this specification.

END OF SECTION

SECTION 3110 – PVC GRAVITY SEWER MAIN

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for furnishing and installing PVC gravity sewer main pipe as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.2 GENERAL

This work shall consist of providing all labor, materials, and equipment necessary for furnishing and installing PVC gravity sewer mains (8" to 27" diameter), including granular bedding and initial backfill in accordance with Section 1200, complete and ready for service as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.3 RELATED WORK

A. Section 1200 Granular Bedding and Initial Backfill Material

PART 2 – PRODUCTS

2.1 PVC GRAVITY SEWER MAIN

All PVC Gravity Sewer Main through 15" diameter shall conform to ASTM D-3034. All PVC Gravity Sewer Main 18" diameter and larger shall conform to ASTM F-679, Type I. Elastomeric gasket joints for both types of PVC Gravity Sewer Main shall conform to ASTM D-3212. Material for PVC Gravity Sewer Main shall conform to the requirements of ASTM D-1784 for cell classification 12364 or 12454. PVC Gravity Sewer Main pipe shall also conform to the following schedule:

Depth of Cover (from top of pipe)	SDR Schedule
<15' of Cover	35
15' up to <28' of Cover	26
28' and over of Cover	17

All PVC Gravity Sewer Main shall be installed in accordance with ASTM D-2321.

PART 3 – SUBMITTALS

3.1 PVC GRAVITY SEWER MAIN PIPE and GASKETED JOINTS

Submit literature and/or catalog cut sheets of the PVC GRAVITY SEWER MAIN PIPE and GASKETED JOINTS to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 GENERAL

The Contractor shall furnish all necessary labor, material, tools, and equipment required in the installation of the PVC Gravity Sewer Main. This work includes furnishing all materials, the proper storage of those materials, saw cutting, dewatering, excavation, laying and joining the pipe, repairing or replacing all drains, sewers, utilities, and any other structures that may be disturbed or damaged by the Contractor's operations. Also included in this item is the disposal of all excavated materials and the testing of the installed pipe. All work shall be completed as shown on the Contract Drawings and as directed by the Owner's Representative. All pipe installation shall be in conformance with ASTM D-2321.

Pipe and fittings shall be handled so that the pipe, joints and gaskets will not be damaged. If damaged, the repair or replacement of such material shall be made by the Contractor at his own expense in a manner satisfactory to the Owner's Representative.

The Contractor is responsible to repair or replace all pavement and roadway surface disturbed by the contractor, as a result of the sewer main installation, to the satisfaction of the governing entity of said pavement or roadway surface.

Flow in existing sewers shall not be disrupted due to construction related to this project. Existing flow (including that caused by rain events) shall be maintained by pumping (or some other approved method) around the construction area. Adequate sizing of the temporary pumps required to convey the existing flow is the responsibility of the contractor. Any temporary pumping required for satisfactory construction of this project shall come at no additional expense to the Owner.

Contractor is required to submit the bypass pumping plan(s) for county review and approval prior to the start of any bypass pumping operations. Bypass pumping shall include, but is not limited to, the following:

- A telemetry alarm notification system for all unattended bypass pump operations.
- Weather-proof signage at the pumping equipment which includes emergency contact information for the Contractor and County.

4.2 PIPE STORAGE

Pipe shall be stored, at the site, in unit packages. Do not stack unit packages more than eight (8) feet in height. When unit packages are stacked, ensure that the weight of upper units does not cause deformation to pipe in lower units. Support pipe unit packages on wood blocking to prevent damage to the bottom surfaces during storage. Space supports to prevent pipe bending.

4.3 HANDLING OF PIPE

When using mechanical equipment, exercise care to prevent damage to pipe. Lower pipe carefully into trenches, DO NOT DROP PIPE. Materials cracked, gouged, chipped, or otherwise damaged will be rejected.

In subfreezing temperatures, use caution to prevent impact damage. Handling methods considered acceptable for warm weather may be unacceptable during very cold weather.

4.4 PIPE INSTALLATION

The proposed location of the gravity sewer main is shown on the Plans. Construction shall begin at the furthest downstream point of the project, unless approved otherwise by the Owner's Representative. A water-tight bulkhead must be installed at the furthest downstream manhole to separate the new work from the existing sewer system. At the successful conclusion of testing, the Contractor must remove the bulkhead.

The laying of pipes in finished trenches shall be commenced at the lowest point so that the spigot ends point in the direction of flow. All pipes shall be laid accurately to the required lines and grades, and shall be uniformly supported along their entire lengths. All possible care shall be used when shoving the pipe together, with a steady pressure, so that the ends of each pipe shall abut against the adjacent pipe in such a manner that there will be no unevenness of any kind along the inverts and a minimum space between the abutting inside walls.

Special care shall be exercised to prevent the entrance of earth and other debris into the pipe. All such earth and debris resulting from construction operations shall be removed from the pipe.

At the close of each day's work, or when pipe is not being laid, the end of the pipe should be protected by a close-fitting stopper with adequate precautions taken to overcome possible uplift.

When cut all rough edges must be filed to provide a smooth, beveled edge.

The Contractor shall furnish, place, and maintain sheeting and bracing as may be required to securely support the sides and ends of the excavation and to prevent injury to the structure being built or to personal property or adjacent utilities.

All PVC gravity sewer mains shall include and shall be installed in bedding and initial backfill material as described in Item 1200-Granular Bedding and Initial Backfill Material.

Final Backfill and pavement replacement shall be installed in accordance with the Village of Mt. Orab Utility Department Standard Drawings and Specifications.

PART 5 – TESTING

5.1 GENERAL

PVC gravity sewer pipe shall be capable of passing the infiltration and exfiltration tests specified herein.

The infiltration or leakage of ground or sub-surface water into the sanitary sewers and manholes shall not exceed the rate of 100 gallons per inch of tributary pipe diameter per 24 hours per mile of length, or the computed equivalent for shorter sections and shorter periods of time.

Sewer testing shall be as ordered by the Owner's Representative and may include infiltration, exfiltration, air testing, or televising.

Prior to testing, the Owner's Representative may require the lines to be flushed and swabbed. Swabbing shall be a rubber inflated ball or other approved method. When required, water for flushing shall be provided by the Contractor at no additional expense to the Owner. All debris debris shall be removed by methods approved by the Owner's Representative.

All testing shall be conducted under the supervision of the Owner's Representative, and the inspection fees include a maximum of two separate testings of the same pipe and if testing has not passed after two separate tests, additional inspection fees will be due prior to acceptance of testing and final inspection.

Upon completion of all required testing, the bulkhead shall be removed at the furthest downstream connection point.

5.2 INFILTRATION TESTING

The Owner's Representative may order the Contractor to make infiltration (leakage) tests of as many sections of the sanitary sewers, as, in the Owner's Representative opinion, may be necessary to determine whether work complies with the above required rate of infiltration. Generally, a section of sewer shall mean the distance between manholes. Such tests will be of 30 minute minimum duration and will only be made at the time of maximum height of ground water, provided that such maximum height of ground water must be at least two (2) feet above the elevation of the outside top of the sewer at the upstream limit of the section being tested. The infiltration test shall be made by installing a weir or other measuring device approved by the Owner's Representative in the lower end of the sewer section to be tested. The quantity of ground water infiltration into the sewer will be measured and shall not exceed the allowable leakage.

5.3 EXFILTRATION TESTING

The Utility Department may also order exfiltration tests to be made. For exfiltration tests, the Contractor shall fill the sewer with water to an elevation of two (2) feet above the outside top of the sewer at the upstream limit of the section being tested. The exfiltration shall not exceed the rate of 100 gallons per inch of tributary pipe diameter, per 24 hours per mile of length, as specified for infiltration.

5.4 LEAKAGE CORRECTION

In case the above requirements for either infiltration or exfiltration are not met, the Contractor shall caulk joints with acceptable materials or do such work as may be necessary until the rate of infiltration or exfiltration is less than the above requirements, as determined by additional infiltration or exfiltration tests.

5.5 AIR TESTING

An approved type of low pressure air test may be used in lieu of the above exfiltration tests at the option of the Owner's Representative. Unless otherwise directed by the Owner's Representative, the sewer will be tested at 5 pounds of pressure for 5 minutes with no loss of pressure.

5.6 TELEVISION INSPECTION

The Owner's Representative may order the Contractor to inspect, by closed circuit television, and test joints of sections of sewers, including sewers with "live" service connections. The testing method shall be subject to the approval of the Owner's Representative. Joints that fail the joint test shall be sealed with an approved chemical grout or excavated for repairs and retested until the joints pass the joint test.

5.7 DEFLECTION TESTING

The Contractor shall also perform a deflection test in all sections of gravity sewer pipe. The test shall be conducted after the final backfill has been in place at least 30 days. Prior to making the deflection tests, the lines shall be flushed and swabbed. Swabbing shall be by an inflated rubber ball or other approved method. The deflection of any sewer pipe shall not exceed 5 percent.

The deflection test shall be made by using a rigid ball or mandrel and shall have a diameter equal to 95 percent of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

Correction of any section of sewer pipe not meeting the deflection test shall be approved by the Owner's Representative.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid per Linear Feet (LF) for Item 3110 – PVC GRAVITY SEWER MAIN. Progress payments will be made based on the installed linear feet of Item 3110 completed.

END OF SECTION

SECTION 3130 – DUCTILE IRON GRAVITY SEWER MAIN

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for furnishing and installing ductile iron gravity sewer main pipe as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.2 GENERAL

This work shall consist of providing all labor, materials, and equipment necessary for furnishing and installing ductile iron gravity sewer mains, including granular bedding and initial backfill in accordance with Section 1200 where required, complete and ready for service as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.3 RELATED WORK

A. Section 1180 Keyblock Anchors
B. Section 1200 Granular Bedding and Initial Backfill Material

PART 2 – PRODUCTS

2.1 DUCTILE IRON GRAVITY SEWER MAIN

All Ductile Iron Gravity Sewer Main shall be manufactured in accordance with AWWA C-151 and shall be in 18 to 20 foot lengths with single rubber gasket push-on joints. All Ductile Iron Gravity Sewer Main shall have a minimum wall thickness of class 50 in accordance with AWWA C-150 and have a cement mortar lining conforming to ANSI/AWWA C104/A21.4. Ductile Iron Gravity Sewer Mains shall be US Pipe Tyton Joint Pipe, American Fastite Joint Pipe, or approved equal.

PART 3 – SUBMITTALS

3.1 DUCTILE IRON GRAVITY SEWER MAIN PIPE

Submit literature and/or catalog cut sheets of the DUCTILE IRON GRAVITY SEWER MAIN PIPE to be used. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 GENERAL

The Contractor shall furnish all necessary labor, material, tools, and equipment required in the installation of the Ductile Iron Gravity Sewer Main. This work includes furnishing all materials, the proper storage of those materials, saw cutting, dewatering, excavation, laying and joining the pipe, repairing or replacing all drains, sewers, utilities, and any other structures that may be disturbed or damaged by the Contractor's operations. Also included in this item is the disposal of all excavated materials and the testing of the installed pipe. All work shall be completed as shown on the Contract Drawings and as directed by the Owner's Representative. All pipe installation shall be in conformance with ASTM A746-09.

Pipe and fittings shall be handled so that the pipe, joints and gaskets will not be damaged. If damaged, the repair or replacement of such material shall be made by the Contractor at his own expense in a manner satisfactory to the Owner's Representative.

The Contractor is responsible to repair or replace all pavement and roadway surface disturbed by the contractor, as a result of the sewer main installation, to the satisfaction of the governing entity of said pavement or roadway surface.

Flow in existing sewers shall not be disrupted due to construction related to this project. Existing flow (including that caused by rain events) shall be maintained by pumping (or some other approved method) around the construction area. Adequate sizing of the temporary pumps required to convey the existing flow is the responsibility of the contractor. Any temporary pumping required for satisfactory construction of this project shall come at no additional expense to the Owner.

4.2 PIPE STORAGE

Pipe shall be stored, at the site, in unit packages. When unit packages are stacked, ensure that the weight of upper units does not cause deformation to pipe in lower units. Support pipe unit packages on wood blocking to prevent damage to the bottom surfaces during storage. Space supports to prevent pipe bending.

4.3 HANDLING OF PIPE

When using mechanical equipment, exercise care to prevent damage to pipe. Lower pipe carefully into trenches, DO NOT DROP PIPE. Materials cracked, gouged, chipped, or otherwise damaged will be rejected.

4.4 PIPE INSTALLATION

The proposed location of the gravity sewer main is shown on the Plans. Construction shall begin at the furthest downstream point of the project, unless approved otherwise by the Owner's Representative. A water-tight bulkhead must be installed at the furthest downstream manhole to separate the new work from the existing sewer system. At the successful conclusion of testing, the Contractor must remove the bulkhead.

The laying of pipes in finished trenches shall be commenced at the lowest point so that the spigot ends point in the direction of flow. All pipes shall be laid accurately to the required lines and grades, and shall be uniformly supported along their entire lengths. All possible care shall be used when shoving the pipe together, with a steady pressure, so that the ends of each pipe shall abut against the adjacent pipe in such a manner that there will be no unevenness of any kind along the inverts and a minimum space between the abutting inside walls.

Special care shall be exercised to prevent the entrance of earth and other debris into the pipe. All such earth and debris resulting from construction operations shall be removed from the pipe.

At the close of each day's work, or when pipe is not being laid, the end of the pipe should be protected by a close-fitting stopper with adequate precautions taken to overcome possible uplift.

When cut all rough edges must be filed to provide a smooth, beveled edge.

The Contractor shall furnish, place, and maintain sheeting and bracing as may be required to securely support the sides and ends of the excavation and to prevent injury to the structure being built or to personal property or adjacent utilities.

All ductile iron gravity sewer mains shall include and shall be installed in bedding and initial backfill material as described in Item 1200-Granular Bedding and Initial Backfill Material, where required by the standard detail drawings (i.e., under driveways, pavement, or when controlled density fill is required for backfill). In all other cases, clean native soil can be used for bedding and backfill.

Final Backfill and pavement replacement shall be installed in accordance with the Village of Mt. Orab Utility Department Standard Drawings and Specifications.

PART 5 – TESTING

5.1 GENERAL

PVC gravity sewer pipe shall be capable of passing the infiltration and exfiltration tests specified herein.

The infiltration or leakage of ground or sub-surface water into the sanitary sewers and manholes shall not exceed the rate of 100 gallons per inch of tributary pipe diameter per 24 hours per mile of length, or the computed equivalent for shorter sections and shorter periods of time.

Sewer testing shall be as ordered by the Owner's Representative and may include infiltration, exfiltration, air testing, or televising.

Prior to testing, the Owner's Representative may require the lines to be flushed and swabbed. Swabbing shall be a rubber inflated ball or other approved method. When required, water for flushing shall be provided by the Contractor at no additional expense to the Owner. All debris debris shall be removed by methods approved by the Owner's Representative.

All testing shall be conducted under the supervision of the Owner's Representative, and the inspection fees include a maximum of two separate testings of the same pipe and if testing has not passed after two separate tests, additional inspection fees will be due prior to acceptance of testing and final inspection.

Upon completion of all required testing, the bulkhead shall be removed at the furthest downstream connection point.

5.2 INFILTRATION TESTING

The Owner's Representative may order the Contractor to make infiltration (leakage) tests of as many sections of the sanitary sewers, as, in the Owner's Representative opinion, may be necessary to determine whether work complies with the above required rate of infiltration. Generally, a section of sewer shall mean the distance between manholes. Such tests will be of 30 minute minimum duration and will only be made at the time of maximum height of ground water, provided that such maximum height of ground water must be at least two (2) feet above the elevation of the outside top of the sewer at the upstream limit of the section being tested. The infiltration test shall be made by installing a weir or other measuring device approved by the Owner's Representative in the lower end of the sewer section to be tested. The quantity of ground water infiltration into the sewer will be measured and shall not exceed the allowable leakage.

5.3 EXFILTRATION TESTING

The Utility Department may also order exfiltration tests to be made. For exfiltration tests, the Contractor shall fill the sewer with water to an elevation of two (2) feet above the outside top of the sewer at the upstream limit of the section being tested. The exfiltration shall not exceed the rate of 100 gallons per inch of tributary pipe diameter, per 24 hours per mile of length, as specified for infiltration.

5.4 LEAKAGE CORRECTION

In case the above requirements for either infiltration or exfiltration are not met, the Contractor shall caulk joints with acceptable materials or do such work as may be necessary until the rate of infiltration or exfiltration is less than the above requirements, as determined by additional infiltration or exfiltration tests.

5.5 AIR TESTING

An approved type of low pressure air test may be used in lieu of the above exfiltration tests at the option of the Owner's Representative. Unless otherwise directed by the Owner's Representative, the sewer will be tested at 5 pounds of pressure for 5 minutes with no loss of pressure.

5.6 TELEVISION INSPECTION

The Owner's Representative may order the Contractor to inspect, by closed circuit television, and test joints of sections of sewers, including sewers with "live" service connections. The testing method shall be subject to the approval of the Owner's Representative. Joints that fail the joint test shall be sealed with an approved chemical grout or excavated for repairs and retested until the joints pass the joint test.

5.7 DEFLECTION TESTING

The Contractor shall also perform a deflection test in all sections of gravity sewer pipe. The test shall be conducted after the final backfill has been in place at least 30 days. Prior to making the deflection tests, the lines shall be flushed and swabbed. Swabbing shall be by an inflated rubber ball or other approved method. The deflection of any sewer pipe shall not exceed 5 percent.

The deflection test shall be made by using a rigid ball or mandrel and shall have a diameter equal to 95 percent of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

Correction of any section of sewer pipe not meeting the deflection test shall be approved by the Owner's Representative.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid per Linear Feet (LF) for Item 3130 – DUCTILE IRON GRAVITY SEWER MAIN. Progress payments will be made based on the installed linear feet of Item 3130 completed.

END OF SECTION

SECTION 3140 – SANITARY SEWER LATERALS, GRAVITY SEWER

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for furnishing and installing sanitary sewer laterals as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.2 RELATED WORK

- **A.** General Specification: Section 1200 Granular Bedding and Initial Backfill Material
- **B.** General Specification: Section 3110 PVC Gravity Sewer Main

PART 2 – PRODUCTS

2.1 PVC PIPE AND FITTINGS

Laterals shall be constructed of 6-inch minimum diameter. Materials of construction shall be the same Standard Dimension Ratio (SDR) as the sewer main being connected to. If the sewer main is not PVC, the lateral shall be PVC with a Standard Dimension Ratio corresponding to the schedule established in Section 3110 PVC Gravity Sewer Main.

2.2 CONNECTION TO MAIN

Wyes for house connections shall be factory made in-line fittings for new sewer installation. Inserta Tee® type fittings shall be permitted when connecting to an existing sewer main. **No glue-on saddles or strap on fittings will be permitted.**

Every structure is to have an independent sanitary service lateral that connects to a Sanitary Sewer main within public right-of-way or within a public easement. If Sanitary Sewer does not exist at the subject property; Owner is required to provide sanitary sewer service to the subject property. No private sanitary lateral services or connections are to be made that cross adjoining property lines.

PART 3 – SUBMITTALS

Submit literature and/or catalog cut sheets of the PVC pipe, fittings and wye connection to be used. Submit to the Owner's Representative for review and approval prior to ordering

PART 4 – EXECUTION

4.1 GENERAL

The Contractor shall furnish and install all wye branches, stopper plates, and wye poles required for future service connections, and connect existing sanitary sewer services at the property line, complete,

as determined in the field and as specified herein.

Wye branches shall be located where shown on the plans or where ordered by the Owner's Representative and shall be standard fittings of the same strength classification of the sewer main.

Existing sewer laterals shall be maintained at all times.

Lateral trenches shall be backfilled with native soil to 4 foot from wye fitting at cleanout to create an impermeable compacted plug.

Lateral connections shall be installed in accordance with Sections 3141 and 3142.

4.2 LATERAL CONNECTION

Lateral connections in conventional gravity systems, shall be constructed of 6 inch minimum diameter sewer pipe and shall include that portion of sewer extending between the sewer main and right-of-way or easement limiting line adjacent to the sewer main. The depth shall be determined by the depth of the lateral at the connection to the sewer main.

Laterals shall enter the gravity sewer main 45° from the 12 o'clock position at the top of the pipe.

Inserta Tee® type fittings shall be installed based on manufacturer's recommendations. Penetrations into the existing sewer main shall be installed using a 6" diameter hole saw. HAMMER TAPS ARE PROHIBITED.

4.3 WYE POLES

Stoppers shall be installed in wye branches which are not immediately extended and at the end of all laterals with the exception only of those which are immediately connected to service connections. The stoppers shall be installed so as to give a watertight seal and shall be of type which may be removed from the pipe without damage to the bell or to the joint material within the bell.

At the end of each lateral connection, there shall be placed a 2 inch by 2 inch pole, painted with two (2) coats of white paint for the upper two feet. Wye poles must be set plumb and secure before any backfill is placed in the trench. The wye pole must be located on the backside of the 6" cleanout riser. The cleanout cap may be left buried three (3') during initial installation. When the structure is connected at a later date, the cleanout must be brought to grade. After the backfilling has been completed and the trench settled and dressed, the location of wye poles shall be measured from the nearest manhole and recorded. The wye poles shall then be driven down flush with the ground, but not until the Contractor has been so instructed by the Owner's Representative. Also where curb exists, sanitary sewer laterals shall be so marked by markings in the curb.

PART 5 – TESTING

All testing will be performed in conjunction with the gravity sewer main as stated in Sections 3110.

PART 6 – BASIS OF PAYMENT

6.1 SANITARY SEWER LATERALS, GRAVITY SEWER

Payment for all labor, material, and equipment necessary to perform lateral installation shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
3140	LF	Sanitary Sewer Lateral

Length of vertical pipe used to install cleanout is incidental to the cost of the lateral.

END OF SECTION

SECTION 3141 – SANITARY SEWER SERVICE CONNECTION, RESIDENTIAL BUILDING

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for a sanitary sewer service connection for a residential building, as shown in the typical details and/or specified herein.

1.2 RELATED WORK

- **A.** General Specification: Section 1200 Granular Bedding and Initial Backfill Material
- **B.** General Specification: Section 3110 PVC Gravity Sewer Main
- **C.** General Specification: Section 3140 Sanitary Sewer Laterals, Gravity Sewer

PART 2 – PRODUCTS

2.1 PVC PIPE AND FITTINGS

Residential sewer service connections shall be constructed of 4 inch minimum diameter, PVC Schedule-40, SDR 35, or SDR 26 (15' or deeper) solid wall sewer pipe and fittings.

2.2 FLEXIBLE PIPE CONNECTORS

Flexible elastomeric pipe couplings and donut type seals used in transition joints between pipes of different material or diameter shall be manufactured of an elastomeric PVC which is chemically resistant, light stable and fungus and mildew resistant. Metal clamps used to attach and clamp the coupling onto the piping, including wormgear and clamp strap, shall be manufactured of series 300 stainless steel. Flexible pipe connectors shall be "shielded" style and be manufactured by Fernco, Inc. or Mission Co.

PART 3 – SUBMITTALS

Submit literature with product's physical properties. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Residential sewer service connections shall be constructed in accordance with Sections 1200 and 3110.

Cleanouts shall be installed at the following individual service locations:

a) At the road right-of-way line and/or at the end of the public easement.
   1. Every structure is to have an independent sanitary service lateral that connects to a Sanitary Sewer main within public right-of-way or within a public easement. If Sanitary Sewer does not exist at the subject property; Owner is required to provide sanitary sewer service to the subject property. No private sanitary lateral services or connections are to

be made that cross adjoining property lines.

b) At each vertical and/or horizontal bend of 22-1/2° or 45° (no 90° bends permitted).

c) Not to exceed (100') one hundred feet.

d) The top of pipe must maintain a minimum 3' of cover.

e) At a distance approximately 20 feet from the structure, native soil will be used as backfill for approximately 4 feet to create an impermeable compacted plug.

f) Inside the connecting structure or within (8) eight feet from the outside wall of said structure.

g) Cleanout caps shall match the PVC material used to construct the cleanout unless in non-grassy areas where cap is to be installed with Neenah R-1976 or approved equal cap.

h) On residential lots, cleanouts will not be located within the driveway or other paved areas. All cleanouts must be located in grassy areas, unless approved by the Owner's Representative.

PART 5 – TESTING

As required by the Owner's Representative and shall conform with Section 3110.

PART 6 – BASIS OF PAYMENT (Not applicable)

END OF SECTION

SECTION 3142 – SANITARY SEWER SERVICE CONNECTION, COMMERCIAL BUILDING

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary for a sanitary sewer service connection for a commercial building, as shown in the typical details and/or specified herein.

1.2 RELATED WORK

- **A.** General Specification: Section 1200 Granular Bedding and Initial Backfill Material
- **B.** General Specification: Section 3110 PVC Gravity Sewer Main
- **C.** General Specification: Section 3140 Sanitary Sewer Laterals, Gravity Sewer

PART 2 – PRODUCTS

2.1 PVC PIPE AND FITTINGS

Commercial sewer service connections shall be constructed of 6 inch minimum diameter, PVC Schedule-40, SDR 35, or SDR 26 (deeper than 15') solid wall sewer pipe and fittings.

2.2 FLEXIBLE PIPE CONNECTORS

Flexible elastomeric pipe couplings and donut type seals used in transition joints between pipes of different material or diameter shall be manufactured of an elastomeric PVC which is chemically resistant, light stable and fungus and mildew resistant. Metal clamps used to attach and clamp the coupling onto the piping, including wormgear and clamp strap, shall be manufactured of series 300 stainless steel. Flexible pipe connectors shall be as manufactured by Fernco, Inc. or Mission Co.

PART 3 – SUBMITTALS

Submit literature with product's physical properties. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Commercial sewer service connections shall be constructed in accordance with Sections 1200 and 3110.

Cleanouts shall be installed at the following individual service locations:

a) At the road right-of-way line and/or at the end of the public easement.
   1. Every structure is to have an independent sanitary service lateral that connects to a Sanitary Sewer main within public right-of-way or within a public easement. If Sanitary Sewer does not exist at the subject property; Owner is required to provide sanitary sewer service to the subject property. No private sanitary lateral services or connections are to

be made that cross adjoining property lines.

b) At each vertical and/or horizontal bend of 22-1/2° or 45° (no 90° bends permitted).

c) Not to exceed (100') one hundred feet.

d) The top of pipe must maintain a minimum 3’ of cover.

e) At a distance approximately 20 feet from the structure, native soil will be used as backfill for approximately 4 feet to create an impermeable compacted plug.

f) Inside the connecting structure or within (8) eight feet from the outside wall of said structure.

g) Cleanout caps shall match the PVC material used to construct the cleanout unless in non-grassy areas where cap is to be installed with Neenah R-1976 or approved equal cap.

h) On commercial lots, cleanouts will not be located within the driveway or other paved areas. All cleanouts must be located in grassy areas, unless approved by the Owner’s Representative.

PART 5 – TESTING

As required by the Owner’s Representative and shall conform with Section 3110.

PART 6 – BASIS OF PAYMENT (Not applicable)

END OF SECTION

SECTION 3143 – SANITARY SEWER SERVICE CONNECTION, LOW PRESSURE FORCE MAIN (LPFM)

PART 1 - GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to connect a sanitary sewer service connection for a low pressure force main as shown in the typical details and/or specified herein.

1.2 RELATED WORK

A. General Specification: Section 1200 Granular Bedding and Initial Backfill Material

PART 2 – PRODUCTS

2.1 PVC PIPE AND FITTINGS

Low pressure force main connections shall be constructed of PVC Schedule-80 solid wall sewer pipe and fittings rated for 200 psi. Discharge piping size shall be in accordance with pump manufacturer's recommendation.

PART 3 – SUBMITTALS

Submit literature with product's physical properties. Submit to the Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

4.1 GENERAL

The property owner shall be responsible for design, operation, maintenance and future replacement of the private pumping system, force main and related appurtenances.

Any pumping system shall be located within the structure it serves.

Check valves and all other portions of the low pressure force main shall meet the pump manufacturer's recommendation.

Every structure is to have an independent sanitary service lateral that connects to a Sanitary Sewer main within public right-of-way or within a public easement. If Sanitary Sewer does not exist at the subject property; Owner is required to provide sanitary sewer service to the subject property. No private sanitary lateral services or connections are to be made that cross adjoining property lines.

4.2 INSTALLATION

The Contractor shall furnish, place, and maintain sheeting and bracing as may be required to securely support the sides and ends of the excavation and to prevent injury to the structure being built or to personal property or adjacent utilities.

Discharge piping shall be installed with a minimum 4 feet of cover to prevent freezing. Bedding and backfill material shall be installed as stated in Section 1200. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed into the trench.

When cutting pipe, all rough edges must be filed to provide a smooth, beveled edge. All fittings shall be solvent welded.

A minimum of 10 feet (10') horizontal clearance (for parallel installations) and 18-inch vertical clearance (at crossings) shall be maintained between all force mains/service laterals and water mains/services The low pressure force main shall discharge at the back of the wye fitting at the cleanout at the edge of the right-of-way.

4.3 GRINDER PUMPS

If a Village Utility customer proposes a grinder pump that ties into a lift station force main, the Village of Mt. Orab Utility Department will make the tap connection and set a well on the property with a check valve and curb stop. The Grinder Pump is purchased and maintained by the Property Owner.

PART 5 – TESTING (As determined necessary)

PART 6 – BASIS OF PAYMENT (Not applicable)

END OF SECTION

SECTION 3200 – GRAVITY SEWER MANHOLE

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to install the standard manholes conforming to the specifications and of the types and sizes shown on the Standard Drawings and shall construct the same in accordance with these Specifications at the locations and to the lines and grades shown on the Drawings.

1.2 LOCATION OF MANHOLES

Manholes shall be installed at points of change in sewer grade, size, or direction, at junctions, at intermediate points and at the end of each line.

Manholes for sewers 36 inches and larger in diameter shall be located near points of change in sewer grade, size or direction in order that standard components may be used.

Manholes shall be installed at maximum intervals of 400 feet for sewers 15 inches in diameter and smaller and 500 feet for sewers 18 inches to 48 inches in diameter.

PART 2 – PRODUCTS

2.1 MATERIALS

Precast concrete bases, risers and tops shall be constructed of reinforced concrete and shall conform to the requirements of the "Specifications for Circular Precast Reinforced Concrete Manhole Sections", ASTM C-478, except as modified herein.

Pipe connection to manhole bases shall be made with flexible rubber compression gaskets conforming to ASTM C923. Pipe to manhole connector for sanitary systems shall be A-LOK X-CEL or equal as determined by the Utility Department.

Joints between precast manhole sections shall be flexible watertight rubber gaskets conforming to ASTM C-443. Additional flexible butyl rubber sealant equal to Conseal type CS-102 shall be applied to the outside and inside horizontal portion of each manhole joint. Care must be exercised to ensure the joints are clean and free of dirt, debris and grease to assure adhesion of the seal material.

1-1/4 inch holes for handling may be cast in the dome and rings. These holes shall be plugged and sealed once the manhole is in place.

Precast adjusting rings shall be reinforced with one (1) No. 3 gage wire or equivalent. A maximum of 12 inches in height of adjusting rings shall be allowed for each manhole. No more than two (2) adjusting rings will be permitted for each manhole. A flexible butyl rubber sealant equal to Conseal type CS-102 shall be used to seal the joint between the manhole top and first adjusting ring and each succeeding joint between said rings.

Composite adjusting rings shall be Infra-Riser Multi-Purpose Rubber Composite Adjustment Riser by East Jordan Iron Works or equal as determined by the Utility Department.

In general, the manholes shall be constructed so the top of the casting is at the elevation of the proposed street grade or to a point 2 inches above the present ground surface or to a point 24 inches above the ground surface of a cultivated field or as ordered. The manhole casting shall be set on a flexible butyl rubber sealant equal to Conseal type CS-102, to provide a seal between the manhole casting and the manhole structure. Care must be exercised to ensure the joints are clean and free of dirt, debris and grease to assure adhesion of the seal material.

Special care shall be exercised to prevent the entrance of earth or debris into manholes and pipe lines. All such earth and debris shall be removed from the manholes and pipe lines during construction operations.

Pipe trench over-excavation required for manhole installation shall be backfilled with compacted granular backfill as specified in the Utility Department Specifications for pipe bedding and initial backfill.

2.2 DROP MANHOLES

Drop manholes shall be used when the invert of the inflow sewer is two feet or more above the manhole invert. When this difference in elevation is less than two feet, the manhole invert shall be filleted to prevent solids deposition.

Drop manholes shall be constructed with:

A) Inside drop pipes as shown on the Utility Department Standard Drawings. Inside drop connections, when approved by the Department, shall be constructed of SDR-23.5 PVC sewer pipe, securely fastened to the inside face of the manhole with stainless anchors and pipe supports.
B) The Reliner Inside Drop System or equal as determined by the Utility Department.

2.3 MANHOLE FRAMES AND LIDS

Manhole castings shall conform to the requirements of the "Standard Specifications for Gray Iron Castings", ASTM Designation A-48. The frames and covers shall be sound, true to form and thickness and neatly finished.

Standard manhole frames shall be equal to Neenah R1775 or East Jordan Iron Works 2045. Standard manhole lids shall be equal to Neenah R1664 or East Jordan Iron Works 2045 and shall be furnished either vented or solid, as specified by the Owner's Representative. Solid lids shall be machined to receive self-sealing gasket.

Four (4) bolt holes shall be furnished in the frame flange for anchoring the frame to the manhole. Four (4) – 3/4" round galvanized steel anchor bolts shall be used to anchor the manhole frame. Anchorage shall be provided through one of the following methods: (a) manhole adjusting rings; (b) directly anchored into the precast manhole. The underside of the cover and the seal of the frame shall be machined to give a true bearing surface.

Manhole covers on sanitary sewers shall have the words "Sanitary Sewer" cast on cover.

2.4 MANHOLE STEPS

Manhole steps shall be either aluminum bar type steps, ASTM B-221, 6061-T6; or a copolymer type having a steel reinforcement bar encapsulated with copolymer polypropylene plastic, Number PS1-PF, as manufactured by M.A. Industries, Inc. or equal as determined by the Utility Department.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of the materials to be used for review & approval by the Owners Representative prior to ordering.

PART 4 – EXECUTION

4.1 MANHOLE CONSTRUCTION

Manholes shall be watertight structures constructed in accordance with one of the following methods:

1. Precast manhole bases, in combinationwith riser sections, transition sections, cones and/or flat slab tops as shown on the Drawings.
2. Monolithic concrete cast-in-place bases, in combination with precast riser sections, cones and/or flat slab tops.

Manholes with precast base sections shall be placed on a 6 inch compacted layer of aggregate base #57 stone.

Where shaping of manhole walls and bottoms is required or ordered to provide for pipe junctions, channels, etc.; such work shall be made with Class "F" concrete conforming to the requirements of ODOT Item 499 and 511. The invert channel and manhole bench shall be constructed as shown in the Standard Drawings. In general, the invert channel shall be a smooth continuation of the pipe and U-shaped. The bench shall provide good footing for workmen and have a 1 inch batter towards the invert channel.

Minimum wall thickness of circular precast manhole bases, risers and cones shall be as scheduled below:

Inside Diameter (feet)	Minimum Wall Thickness (inches)
4	5
5	6
6	7
6.5	7.5
8	9

Openings for the inlet and outlet sewer pipes shall be cast in the precast units.

All pipe entering manholes at precast openings and along all barrel sections shall be sealed by means of imbedded flexible rubber gaskets.

Flexible grout to be utilized on the inside of all manholes at all joints, steps, and pipe as directed by the Utility Department.

Manholes planned within any pavement will have the rim match the profile and section of the existing roadway.

PART 5 – TESTING

The manholes will be tested and inspected for damage prior to placing in service, under the Utility Department supervision, after installation is complete to show they are watertight.

A. This specification shall govern the vacuum testing of sanitary sewer manholes and structures and shall be used as a method of determining acceptability in accepting maintenance of a sanitary sewer manhole or structure. Vacuum testing shall be according to ASTM C1244, except as specified otherwise herein. All new sanitary sewer manholes and structures shall be tested by vacuum test as specified herein to test for leaks.
B. Manholes shall be tested after installation with all connections in place.
   1. Lift holes, if any, shall be plugged with an approved, no-shrinkable grout prior to testing.
   2. Drop connections shall be installed prior to testing.

3. The vacuum test shall include testing of the seal between the cast iron frame and the cone, slab or grade rings.
4. The manholes shall be backfilled and finished to design grade.
5. If a coating or lining is to be applied to the interior of the manhole the vacuum test must not be performed until the coating or lining has been cured according to the manufacturer's recommendation.
6. If existing manholes are to be vacuum tested (e.g. in the case of a sewer rehabilitation project), then Village of Mt. Orab must deem the manhole structurally sound prior to vacuum testing.

C. Procedure for testing shall be as follows:

1. Temporarily plug, with the plugs being braced to prevent the plugs or pipes from being drawn into the manhole, all pipes entering the manhole at least six inches into the sewer pipe(s). The plug must be inflated at a location past the manhole/pipe gasket.
2. The test head shall be placed inside the frame at the top of the manhole and inflated, in accordance with the manufacturer's recommendations.
3. A vacuum of ten inches of mercury (10"Hg) shall be drawn on the manhole. Shut the valve on the vacuum line to the manhole and shut off the pump or disconnect the vacuum line from the pump.
4. The pressure gauge shall be liquid filled, having a 3.5 inch diameter face with a reading from zero to thirty inches of mercury.
5. The manhole shall be considered to pass the vacuum test if the time for the vacuum reading to drop from 10" to 9" Hg meets or exceeds the values indicated in the following table:

Unless otherwise directed by the Utility Department, all manhole vacuum testing shall include the manhole frame.

Minimum Test Times for Various Manhole Diameters (minutes and seconds)

MH Depth (feet)	4' Diameter MH	5' Diameter MH	6' Diameter MH
15 feet or less	50 sec.	1 min. & 5 sec.	1 min. & 20 sec.
15.01 to 30 feet	1 min. & 20 sec.	1 min. & 45 sec.	2 min. & 10 sec.

6. If a manhole fails the vacuum test, the manhole shall be repaired with material approved by Village of Mt. Orab. The vacuum test shall then be repeated until a satisfactory test is obtained.
7. All temporary plugs and braces shall be removed after each test.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Each (EA) price bid for Item 3200 – GRAVITY SEWER X' DIAMETER MANHOLES.

Item	Unit	Description
3200	Each (EA)	GRAVITY SEWER X' DIAMETER MANHOLES

3200	Each (EA)	GRAVITY SEWER X’ DIAMETER DROP MANHOLES

Progress payments will be made based on the manholes actually installed, as measured by the OWNER’S REPRESENTATIVE. The Contractor shall review the submitted units completed and provide confirmation to the Owner’s Representative of the measurements prior to payment for work under this specification.

END OF SECTION

SECTION 3300 – SANITARY SEWER PUMP STATION, GENERAL

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for furnishing and installing a sanitary sewer pump station as indicated on the Standard Drawings, except as identified in Section 3301-Sanitary Sewer Pump Station, Electrical, and as specified herein.

1.2 GENERAL

This work shall consist of providing all labor, materials, and equipment necessary for furnishing and installing a wet well, valve vault, bar screen manhole, a chemical feed tank, equipment support pads, duplex motor driven submersible sewage pumps, internal piping, and valves as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.3 RELATED WORK

A. Section 3200 Gravity Sewer Manhole
B. Section 3301 Sanitary Sewer Pump Station, Electrical
C. Section 3310 PVC Sewer Force Mains

PART 2 – PRODUCTS

2.1 CAST-IN-PLACE CONCRETE

Cast-In-Place Concrete shall be used only to construct equipment support pads, unless otherwise indicated on the drawings. Cast-in-place concrete shall be Class C Concrete with a minimum 28-day compressive strength of 4,000 psi and slump of 4" or less. Steel reinforcement for cast-in-place concrete shall be placed as indicated on the drawings, as recommended by the equipment manufacturer, or as directed by the Owner's Representative. Steel reinforcement bars shall meet the requirements of the "Standard Specifications for Deformed and Plain Billet Steel Bars for Concrete Reinforcement", ASTM A 615, Grade 60. Cast-In-Place Concrete shall include "Fiber Reinforcement Additive."

2.2 CIRCULAR PRECAST PUMP STATION STRUCTURES

All Pump Station structures, except equipment support pads, shall be constructed of precast concrete units. Precast concrete units include the wet well, bar screen manhole, and valve chamber, and shall be constructed in accordance with Section 3200, Gravity Sewer Manhole and the Standard Detail Drawings.

2.3 PRECAST BOX SECTIONS

Where precast box sections are required on the drawings, they shall conform to the requirements of ASTM C-789, except as modified herein.

Precast box sections shall be designed to withstand a total lateral earth pressure and hydrostatic pressure (psf)=80 pcf x feet of depth, using a minimum factor of safety of 1.7.

The walls shall have a minimum thickness of 8 inches and all joints between riser sections shall be sealed with a flexible watertight butyl rubber sealant equal to Conseal, Type CS-102. Openings for pipes shall be cored in the precast units after the various structures have been constructed.

Flat slab tops shall have a minimum thickness of 12 inches and be reinforced for highway loading. The flat slab shall be precast with recessed lifting lugs and the access hatches, wall pipe and embedded electrical accessories in place.

2.4 ACCESS HATCHES

Access hatches for lift station structures shall have ¼" thick diamond plated aluminum covers with aluminum channel frames and stainless steel hinges and hardware. Hatches shall be capable of supporting a minimum live load of 300 psf. Covers shall be easily controlled throughout the entire arc of opening and closing, include a hold-open mechanism, and have a hasp locking device. Coat all aluminum in contact with concrete with a bituminous coating.

Wet well hatches shall include fall protection grating meeting all applicable OSHA fall protection requirements. Fall protection grating shall be constructed of all aluminum and stainless steel parts and include a hold-open mechanism.

Hatches and fall protection systems shall be supplied in the sizes and door orientations noted in the project documents and meet the minimum absolute clear space opening required for the provided submersible pumps and other devices provided. Acceptable hatch manufactures include Bilco, Halliday, or approved equal.

2.5 EXPOSED PIPING - DUCTILE IRON PIPE

In general, all pipe not buried in the ground or pipe encased in concrete shall be Class 53 Ductile Iron flanged mechanical joint pipe in accordance with ANSI A21.15, AWWA C-115. Flanges shall be Class 125 drilled in accordance with American National Standard B16.1. Rubber gaskets (1/8" thick) of "Rainbow" or other approved quality shall be used in all flanged joints. All flanged joint gaskets shall be full faced type.

All ductile iron pipes, fittings and sleeves shall have a thin bituminous coated cement lining in accordance with ANSI A21.4 (AWWA C-104).

Bolts and nuts for flanged piping within the wet well, valve vault or any other corrosive environment, as determined by the Owner's Representative, shall be Type 304 stainless steel. All heads and nuts shall be hexagonal, trimmed and chamfered. All heads, nuts and threads shall be of the United States standard sizes. Where flanged joints are buried in the ground, and where specifically shown on the drawings, bolts, nuts and washers shall be Type 304 stainless steel and shall not be painted. All stainless steel nuts and bolts shall be coated with an approved nut-lock compound to prevent loosening and to allow disassembly. Where stainless steel bolts and nuts are used, electrical isolation sleeves shall be installed in all bolt holes to separate dissimilar metals.

2.6 PAINTING – DUCTILE IRON PIPE AND FITTINGS & IRON AND CARBON STEEL EQUIPMENT

All exposed ductile iron pipe and fittings, and all other exposed iron and carbon steel equipment surfaces, shall receive an outside shop primer of polyamide epoxy (4 mil) and a finish coat of polyurethane (4 mil).

Piping within the wet well shall receive a shop primer (10 mil) and finish coat (10 mil) of coal tar epoxy.

Piping within the valve vault shall receive a shop primer (4 mil), intermediate coat (4 mil), and finish coat (4 mil) of polyamide epoxy.

Approved manufacturers and paint codes are identified in the table below.

Generic Name	Tnemec	PPG	Carboline	International	Sherwin Williams
Polyamide Epoxy	Series N69-H.B. Epoxoline II	Aquapon HB 97-130	Carboguard 893 SG	Devran 224 HS	Macropoxy 646
Coal Tar Epoxy/Ultra High Build Epoxy	Series 46H-413 Black HB Tneme-Tar	Coal Cat 97-650	Bitumastic 300M	Devtar 5A	Hi-Mil Sher Tar
Polyurethane	Series 1074 H.B. Endura-Shield II	Pitthane Ultra 95-812	Carbothane 134 HG	Devthane 379	Acrolon 218HS

All buried or concrete encased ductile iron pipe and fittings shall have an outside shop coating of bituminous paint in accordance with AWWA C-110.

2.7 BURIED PIPING - PVC PIPE

In general, all buried piping used for the pump station shall be Polyvinyl Chloride (PVC) pressure pipe conforming to the requirements of Specification 3310 – PVC Sewer Force Mains.

2.8 EXPANSION COUPLINGS

Expansion couplings shall be installed where indicated on the Standard Drawings and shall be Style No. 138 as manufactured by Dresser, Type 411 by Smith-Blair, Inc., or approved equal.

2.9 PIPE HANGERS AND SUPPORTS

Pipe supports shall be constructed of Type 304 Stainless Steel in standard structural steel shapes or special supports as manufactured by Elcen, ITT Grinnell, or approved equal. Pipe supports fastened to floor or wall concrete shall be anchored with Type 316 stainless steel stud type expansion anchors. Pipe supports fastened to ceiling concrete shall be anchored with flush setting, corrosion resistant, expansion type threaded shields. Stud type anchors shall be all Type 316 stainless steel, including studs, wedges, washers and nuts.

2.10 PIPE SEALS

All pipes that pass through walls and slabs shall be sealed to fill the annular space between the pipe and the cored hole through which the pipe passes. All metal parts of the seal shall be 300 series stainless steel, all links shall be EPDM rubber, and pressure plates shall be Delrin. All seals shall be watertight to 40 feet of head. Pipe seals shall be Link-Seal, service designation S (corrosive service), as manufactured by Thunderline Corporation, or approved equal.

2.11 PLUG VALVES

Plug valves shall be of the non-lubricating, rising stem, eccentric type with resilient faced plugs and ANSI 125 lb. flanged ends. Bodies shall be ductile iron or cast iron with raised seats and shall be of the bolted bonnet design, suitable for 150 psig pressure. Bearings shall be noncorrosive and permanently lubricated. Valve seats shall be nickel, or nickel-coated stainless steel or bronze. Valve packing shall be Nitrile- Butadiene (Buna (VEE)). The valves shall provide drip-tight shut-off in either direction approved equal.

Each plug valve shall be furnished with a handwheel and gear actuator. Gear actuators shall be of the totally enclosed wormgear type, oil or grease lubricated and sealed for watertightness, with self- lubricating bronze or stainless steel sleeve bearings, thrust bearings, built-in adjustable opening and closing stops and valve position indicators. Each actuator shall be sized to require not more than 300 inch pounds of torque in the input shaft to seat and unseat the valve plugs at the pressure drops

specified herein. Valves shall open with a counterclockwise turn and shall provide drip-tight shut-off in either direction up to 150 psig.

Plug valves shall be manufactured by one of the following, or approved equal: American AVK (3-12 inches), Clow/M&H (3-12 inches), DeZurik (3-72 inches), Milliken (3-72 inches), Pratt (1/2 - 36 inches), and Val-Matic (1/2 – 36 inches).

2.12 CHECK VALVES

All check valves shall be iron body, bronze mount, with outside lever and spring, stainless steel hinge pin, 150 psi working pressure and 300 psi test pressure. Check valves shall be American AVK Series 41, Mueller Company No. A-2600-6-02, Clow F-5340 or F-5381, or approved equal.

2.13 SUBMERSIBLE SEWAGE PUMPS

Each pump shall be a submersible sewage type designed to pump raw, unscreened sewage containing 3 inch diameter solids without damage during operation and shall be rated for continuous, 24-hour per day service.

Submersible pumps shall be capable of running at shut-off head without damage to seals, shafts and bearing and shall be non-overloading at any point on the pump curve. Major pump components shall be of gray cast-iron with smooth surfaces void of blow holes and other irregularities. All mating sections shall be gasketed watertight. All exposed nuts, bolts and washers shall be stainless steel.

All electrical equipment within the wet well, including pumps, motors, controls and control wiring, lights, power wiring, wiring devices and other accessories, shall comply with Article 501 of the National Electric Code for Class I, Division I locations (explosion proof).

Pump manufacturers shall be Flygt Corporation, EBARA, or approved equal.

Impellers - Impellers shall be cast-iron, dynamically balanced, double shrouded, with long thrulet with no acute turns, and with a heavy-duty stainless or bronze wear ring. The impellers shall be designed to handle solids, sludge and fibrous materials. Provide with repelling vanes on the back of the shroud to prevent collection of solids and reduce the pressure on the seals.

Shafts and Seals - Pumps shafts shall be stainless steel and shall be supported by permanently lubricated inboard and outboard bearings using 400 series. Seals shall be tandem double mechanical type running in an oil bath and shall not require a pressure differential to effect sealing. The lower seals shall be tungsten carbide. Each pump shall be equipped with a moisture sensing device to detect water leakage past the seals and to provide an alarm contact output to the pump control circuit as shown on the drawings.

Motors - Pump motors shall be NEMA Design B, 1.0 (minimum) service factor, 480 volts, 3 phase, 60 hertz, Class F insulation rated 155^{o}C (311^{o}F), with three thermal devices (one per phase), embedded in

the windings and connected so as to shut the pump down and provide an alarm contact output in the event of excessive motor temperatures.

Power and Control Cables - Pump power and control cables shall be “SO” type or approved equal, and enter the pump through heavy-duty entry assemblies which shall include elastomer grommets to protect against leakage. Cable strain relief assemblies shall be included.

Discharge Coupling - Each pump shall be furnished with a discharge coupling and mating base elbow. The elbow shall be complete with stainless steel anchor bolts and shall mate with the flanged discharge piping. Seal of the pump discharge coupling to the base elbow flange shall be accomplished by a simple downward linear motion of the pump with the entire weight of the pump being guided by two guide bars to press tightly against the discharge elbow forming a leakproof connection. Metal to metal connections shall be permitted. No part of the pump shall bear directly on the sump floor and no rotary motion of the pump shall be required for sealing.

Guide Bars – Each pump shall be furnished with two guide bars to permit rising and lowering the pumps. The bars shall be of adequate length to extend from the lower guide holder on the pump discharge connection to the upper guide bracket at the access cover. Guide bars shall be 2-inch schedule 40 stainless steel pipe, or as recommended by pump manufacturer. Intermediate guide bar supports shall be provided for each pair of guide bars. Each set of guides shall also include stainless steel cable holders and stainless steel lifting chains with hooks.

2.14 LIQUID LEVEL SENSORS

The Contractor shall furnish and install a submersible level transmitter for pump control and level alarms within the pump station wet well and non-floating type level sensor for local high water alarm in the wet well and in the bar screen manhole.

The submersible level transmitter shall consist of a piezoresistive sensing element, encased in a 316 SS housing. The sensing element shall have a 0-10 psi range and an accuracy of at least ±0.25%. Acceptable products include Mercoid #PBLT2-10-60 or approved equal.

The non-floating type level sensors shall consist of a mercury or mechanical switch in a smooth pear shaped chemical resistant polypropylene casing suspended on its own cable. The units shall be suitable for use in liquids with a specific gravity range of .65 to 1.5 and a temperature range of 32^{o} to 140^{o}F. Acceptable products include Flygt ENM-10 or approved equal.

Each unit cable shall be protected with a synthetic jacket and consist of 19 AWG wire. Sensor cables shall be furnished having minimum of 30 feet length.

2.15 GUARD POSTS

The Contractor shall furnish and install the steel guard posts as specified and as shown on the Standard Drawings. Steel posts shall be 6 inch diameter, schedule 40, steel pipe, 6 feet long, shall be installed in 3 foot deep augered holes, and anchored and filled with Class "F" Concrete as specified herein.

Steel pipe may be hot dip galvanized or mild steel pipe power wire brush cleaned and given an outside shop primer of polyamide epoxy (2 mil) equal to Porter: MCR-43 epoxy primer 4300, a finish coat of polyamide epoxy (4 mil) equal to Porter: MCR-43 Hi-Build and a final finish coat of aliphatic urethane (2 mil) equal to Porter: Hythane.

2.16 CHAIN LINK FENCE AND GATES

The Contractor shall furnish and erect chain link fencing and gates where shown on the Detail and Standard Drawings. In general, the fence will be 7 feet above grade (including 3 strands of barbed wire occupying the top 1 foot) with green privacy strips installed on entire fence. Gate(s) shall be supplied with a lift bar type lock post and a heavy duty padlock keyed to the Utility Department master.

Fence Fabric - shall be No. 9 gauge high quality, medium carbon steel woven in 2 inch mesh and aluminum coated in conformance with ASTM-A491 requirements. Fabric shall be fastened to line posts with fabric bands spaced approximately 14" apart, and to the top rail with tie wires, spaced approximately 24" apart. Connection to terminal posts shall be with ¼" x ¾" galvanized steel tension bars and 7/8" bands at 14" intervals.

Posts – Line posts shall be 2.25" x 1.7" H-Beams, 4.1 lbs/ft, or 2.5" O.D. Standard Weight Pipe, 3.65 lbs/ft. End, Corner and Pull Posts shall be 3" O.D. Standard Weight Pipe, 5.79 lbs/ft. All posts shall be hot dipped galvanized (2.0 oz/sq. ft. average) after fabrication. All intermediate posts shall be fitted with hot dip galvanized extension arms of pressed steel. End, gate and corner posts to be fitted with heavy malleable iron arms. Each arm to carry three (3) barb wires securely fastened thereto. Topmost barbed wire to be 12" above the fabric and 12" out from the fence line at an angle of 45 degrees.

Top Rail - Shall be hot dip galvanized pipe 1-5/8" O.D. or "H" section, weight 2.27 lbs. per lineal foot; provided with couplings approximately every 20 feet. Couplings to be outside sleeve type and at least 7" long; one coupling in every five to have a heavy spring to take up expansion and contraction of top rail. Top rail to pass through base of line post tops and from a continuous brace from end to end of each stretch of fence. Top rail to be securely fastened to terminal post by pressed steel connections.

Braces - Shall be hot dip galvanized and of the same material as the top rail. Braces to be spaced midway between top rail and ground and to extend from terminal post to first adjacent line post. All braces shall be securely fastened to posts by suitable pressed steel connections, then trusses from line post back to terminal post with a 3/8" round rod.

Barbed Wire - Shall consist of three (3) lines of 4-point pattern, each composes of two strands of No. 12-1/2 gauge galvanized wire.

Gate - Furnish and install the gate (swing or slide) as shown on the Contract Drawings, or as directed by the Owner's Representative. Gate shall be full 7 foot height with clear opening dimensions as shown on the Standard Drawings. Gate shall be braced and topped with barbed wire and brackets similar to the fence. Gate frames shall be constructed of 2" O.D. Standard Weight Pipe, 2.72 lbs./ft. with welded,

malleable or heavy pressed steel corners. Frames shall have fabric matching the fence and shall have 3/8" diameter adjustable truss rods to prevent sag or twist. Gate posts shall be 3" O.D. Standard Weight Pipe, 5.79 lbs./ft. for gates 5 feet wide, or less, 4 feet in width, and 4" O.D. Standard Weight Pipe, 9.11 lbs./ft. for gates 10 feet to 20 feet in width, and 4" O.D. pipe 10.62 lbs./ft. for gates 20 feet to 28 feet in width. Gate shall be supplied with a lift bar type lock post and a heavy duty padlock keyed to the District master.

If swing gate, the gate shall be furnished with heavy duty galvanized hinges which afford minimum 180^{o} swing. Double gate shall have a center rest and hold-open chains. Latch shall accommodate padlock fastening from either side.

If slide gate, provide manually operated aluminum sliding gate suitable for a 15-ft clear slide gate installation. Provide manufacturer's standard top rail, cantilevered type sliding gate that incorporates a track for the top roller and guide posts to keep the gate on the rollers. The gate track shall be a semi-enclosed, keyed member extruded from aluminum alloy. The top member, keyed to interlock with the track, shall be a 3x5 inch aluminum alloy structural channel extrusion. External rollers shall have accessible grease fittings, and internal rollers shall have sealed lubricant ball bearings. Adequately brace the gate frame with vertical (2-in aluminum tube) and diagonal (3/16-in stainless steel aircraft cable) components to prevent sagging and apply fabric to entire gate. Fabricate and install gate such that a maximum of 4" clearance is between finished grade and the bottom of the gate frame. Provide gate stop, catch, and keeper with heavy duty padlock keyed to the District master.

Warranty – The manufacturer shall provide a 15-year warranty against rust and corrosion of the fence and 3-year warranty from defects in material and workmanship for the gate.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of all pumps, liquid level sensors, and hoists to be used. Submit to the Owner's Representative for review and approval prior to ordering.

Pump submittals shall include the following:

Shop Tests – Provide certified data from similar pump on performance tests.

Pump Tests – Provide certified data from performance tests of <u>each</u> pump to be provided. The tests to be performed shall certify the hydraulic performance of the pump. Where applicable, the tests shall be in accordance with the Hydraulic Institute Standards. Certified curves and data sheets shall be provided to the Owner's Representative for approval prior to shipment.

Field Tests – Demonstrate that pumps can operate as specified, installed and as submitted. All field tests to be performed by, and all test reports to be prepared by, an authorized factory representative.

Following installation and prior to final acceptance, Pump Operation and Maintenance Manuals shall be furnished to the Owner's Representative for review and approval. Operation and Maintenance Manuals to include a detailed parts list, repair data, manufacturing data for couplings, bushings and pump seal assemblies, electrical diagrams, mechanical diagrams, troubleshooting data, test data, repair parts and maintenance materials, and warranty data.

3.2 SPARE PARTS

The following spare parts are required to be submitted prior to final acceptance:

Pump Spare Parts:	One (1) set of seals and o-rings
	One (1) full set of bearings
	One (1) wear ring
	One (1) impeller

PART 4 – EXECUTION

4.1 GENERAL

The Contractor shall furnish all necessary labor, material, tools, and equipment required in the installation of the Sanitary Sewer Pump Station, except as identified in Section 3301 – Sanitary Sewer Pump Station, Electrical. This work includes removal of structures and obstructions, earthwork, concrete, reinforcing steel, pump station structures, expansion joints, access hatches, buried and exposed piping, pipe couplings, pipe hangers and supports, pipe seals, valves, submersible pumps, access drives, guard posts, chain link fence and gates, site clearing and restoration. All work shall be completed as specified, as shown on the Contract Drawings and as directed by the Owner's Representative.

The surface elevation of all equipment pads, the wet well, bar screen manhole, and valve chamber shall be installed at the same elevation, to provide a level site upon final grading and backfill. The entire fenced site, other than area designated to be paved, will have a 2 mil plastic vapor barrier placed 1' past the fence line and covered with 6" of compacted #4 stone.

The Contractor is responsible to repair or replace all pavement and roadway surface disturbed by the contractor, as a result of the sewer pump station installation, to the satisfaction of the governing entity of said pavement or roadway surface.

Flow in existing sewers shall not be disrupted due to construction related to this project. Existing flow (including that caused by rain events) shall be maintained by pumping (or some other approved method) around the construction area. Adequate sizing of the temporary pumps required to convey the existing flow is the responsibility of the contractor. Any temporary pumping required for satisfactory construction of this project shall come at no additional expense to the Owner.

4.2 CONCRETE

Where required, installation of reinforcing steel shall conform to the requirements of ODOT 509, except as modified herein. All top bars in slabs shall be furnished with a standard hook at discontinuous edges; however, base slabs shall have hooks on the bottom bars.

Where the underneath side of the concrete slabs will be exposed, the reinforcing shall be supported with a non-corrosive and non-staining type chair, bolster or support.

Suitable moldings or bevels shall be placed in the concrete forms to bevel the corners and edges of the concrete to provide a continuous chamfer unless otherwise directed by the Owner's Representative.

Precast concrete structures may have 1 ¼" holes for handling cast in the risers. These holes shall be plugged once the structure is in place.

4.3 PIPING

In general, all pipe not buried in the ground or pipe encased in concrete shall be Class 53 Ductile Iron flanged mechanical joint pipe in accordance with ANSI A21.15, AWWA C-115 and all buried piping used for the pump station shall be Polyvinyl Chloride (PVC) pressure pipe conforming to the requirements of Specification 3310 – PVC Sewer Force Mains.

Cutting Pipe – Whenever a length of pipe requires cutting to make a closure in the line, the work shall be done in a satisfactory manner so as to leave a smooth end at right angles to the axis of the pipe. For ductile iron pipe, cut ends shall be coated with bitumastic or primer as required to match shop coat.

Drilling or tapping – All drilling and tapping for threaded pipe connections, shown on the Standard Drawings or required by the Owner's Representative, shall be done in such a manner that the pipe, when screwed tightly into the tapped hole, will not project into the pipe or fittings.

Pipe Hangers and Supports – The Contractor shall furnish and install all pipe supports as shown and located on the Standard Drawings. Where pipe supports are not shown on the Standard Drawings, the Contractor shall locate and select the supports as approved by the Owner's Representative.

4.4 VALVES

Plug Valves - Where possible, all plug valves shall be installed with shafts horizontal and plugs opening to the top of the valve. Seat ends of plug valves shall be located such that when closed, the line pressure will hold the plug against the seat, unless specifically noted otherwise on the drawings.

4.5 PAINTING

All metal surfaces, other than stainless steel, shall have non-machined surfaces painted in accordance with Section 2.6 of this specification.

4.6 LIQUID LEVEL SENSORS

Level Sensors shall terminate in the junction box mounted on the wet well slab. All liquid level sensors shall be readily accessible from the hatch opening. Liquid level sensors shall be provided as scheduled below (reference standard details S5.1.1 and S5.1.2) and installed as shown on standard detail S5.1.4:

Liquid Level Sensor Type	Installation Elevation
Submersible Level Transmitter	Below Elev. “F”
Non-Floating Type Level Sensors	Elev. “J”

4.7 GUARD POSTS AND FENCE POSTS

All guard posts and fence posts shall be installed 3’ deep and embedded in class “F” concrete. Post hole diameters shall be a minimum of 9 inches for line posts and 12 inches for all other posts. Concrete tops shall be crowned to shed water. Guard Posts shall be painted safety yellow.

4.8 ACCESS DRIVEWAY – ASHPALT CONCRETE ON AGGREGATE BASE

Where indicated on the drawings, the pump station access driveway shall consist of the following:

Aggregate Base - Two (2) 6” courses of compacted crushed aggregate meeting the material requirements of ODOT 304

Asphalt Surface Course – One (1) 2” compacted courses of asphalt surface meeting the material requirements of ODOT 448

PART 5 – TESTING

5.1 GENERAL

The Contractor is responsible to provide all tools, materials, gauges, and water that are necessary to complete the testing as specified herein. All testing must be witnessed and approved by the Owner’s Representative.

5.2 PIPING

All piping shall be tested in accordance with Section 3310, PVC Sewer Force Main. Testing to be performed after all couplers have been installed. Contractor to provide, at no additional cost to the Owner, all bulkheads required to complete the testing.

5.3 MANUFACTURER'S REPRESENTATIVE

The Contractor shall secure the services of a technical representative of the various equipment manufacturers to supervise, adjust, align and check the installation of said equipment and to instruct the Utility Department operating personnel in the operation, care and maintenance of the equipment. All equipment shall be given a running test to demonstrate to the Utility Department its readiness for continuous operation.

5.4 WET WELL, BAR SCREEN MANHOLE, AND VALVE CHAMBER

The wet well, bar screen manhole and valve chamber shall all be vacuum tested in conformance with Section 3200, Gravity Sewer Manhole. If it is determined to be impractical, and authorized by the Owner's Representative, a hydrostatic test may be performed in lieu of vacuum testing. If a hydrostatic test is the approved testing method, it shall be conducted in accordance with AWWA D110-04, Section 5.13 'Watertightness' testing.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the lump sum unit price bid for Item 3300 – Sanitary Sewer Pump Station, General. Any additional materials required by the pump manufacturer, but not shown on these drawings, to allow these pumps to function in the required manner and in accordance with the pump warranty, shall be furnished and installed as part of this item. All electrical equipment furnished under this section shall meet all requirements of Section 3301-Sanitary Sewer Pump Station, Electrical.

All wiring from the pumps to the pump junction boxes, as shown on the drawings, shall be furnished under Item 3300. All electrical connections shall be performed as part of Section 3301 – Sanitary Sewer Pump Station, Electrical.

The Contractor also has the option to bid both the General work and Electrical work (Sections 3300 and 3301). Bid options are as follows:

Item	Unit	Description
3300	Lump Sum (LS)	Sanitary Sewer Pump Station, General
3300 / 3301	Lump Sum (LS)	Sanitary Sewer Pump Station, Complete

END OF SECTION

SECTION 3301 – SANITARY SEWER PUMP STATION, ELECTRICAL

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for furnishing and installing a sanitary sewer pump station as indicated on the Standard Drawings, except as identified in Section 3300-Sanitary Sewer Pump Station, General, and as specified herein.

1.2 GENERAL

This work shall consist of providing all labor, materials, and equipment necessary to construct, install and place in satisfactory service, the complete electrical systems and all electrical work as specified herein and as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

The electrical work shall include the following:

a) Conduit, conductors, circuits, switches, connections, etc. for all electrically operated equipment furnished for the Pump Station. All wiring, conduit, circuit breakers, fuses, switches, motor starters, transformers, pilot devices, control circuits, wiring connections and any electrical device necessary for the completion of the Pump Station, shall be furnished and installed.

   It shall be the responsibility of the Contractor to check and coordinate all of the electrical work required for the Pump Station; to provide the correct electrical service to each piece of electrical equipment furnished and installed; and to check and coordinate the required electrical service and controls with the actual utilization equipment provided.

b) Service Entrance, 480 volts, 3 phase, 60 cycle, A.C. from Service Entrance drop provided by Duke Energy to the Service Disconnect.

c) Distribution System for Power, complete, including Pump Control Panel, Emergency Standby Electric Generator, transfer switch, feeders, circuit breakers, fuses, switches, motor starters, control equipment and connections to utilization equipment at 460 volts, 3 phase, 60 Hz A.C.

d) Distribution Systems for Single Phase power, complete including feeders, control power transformers, circuit breakers, branch circuits, switches, receptacles, connections to utilization equipment and all other appurtenances at 120 volts, 1 phase, 60 Hz A.C.

e) Grounding Systems.

f) Service of a competent field engineer from the staff of the equipment manufacturer to check out and approve the installation of the major units of electrical equipment.

Equipment specified by means of a manufacturer's designation does not limit the equipment to that manufacturer but is for the purpose of establishing standards. Equipment furnished shall meet the detail requirements of these specifications and shall be the products of General Electric, Siemens or Square D (listed alphabetically) or approved equal by others, with a NEMA rating.

g) Supervisory Control and Data Acquisition (SCADA) System components.

1.3 RELATED WORK

A. Section 3300 Sanitary Sewer Pump Station, General

PART 2 – PRODUCTS

2.1 GENERAL

All materials used shall be new and shall bear the inspection labels of Underwriters' Laboratories if material is a class inspected by said laboratory.

All work and appliances shall conform to the requirements of the National Electrical Code, to the requirements of the Ohio Board of Building Standards, to the regulations of Village of Mt. Orab, to the additional requirements of these Specifications, and is subject to the approval of the Electrical Inspector assigned by the Division of Factory and Building Inspection. The Contractor shall obtain all necessary permits required to perform the work required for the Pump Station.

Where discrepancies arise between codes, the most restrictive regulation shall apply. The Specifications are intended to reinforce and strengthen the above regulations and codes and add additional requirements to the regulations and codes. It is not intended that these Specifications be in conflict with any applicable regulations and codes but to only supplement the regulations and codes.

Workmanship shall be first class in every respect and the Contractor's attention is called to the fact that neat and workmanlike appearance in the finished work is required.

2.2 WIRING

All conductors shall be annealed copper, stranded insulated wire. All wires shall be run in aluminum rigid metal conduits unless otherwise specified herein. The sizes of the conductors shall conform to the

requirements of the National Electrical Code with the additional requirements for minimum sizes specified herein.

True three phase required/no open delta on all motors 15HP and larger.

No wire smaller than No. 12 AWG shall be used except that remote control circuits for motor starters and electronic equipment power feeds may be No. 14 AWG stranded wire if the circuits require less than 10 amperes. Insulation for all low voltage wires shall be 600 volt rated Type THHN/THWN unless specified otherwise herein.

All underground wiring should be type XHHW-2 for power and Class 1 control circuits, rated 600v insulation. Belden 8760 or equivalent for all 4/20 MA control wiring, rated 300V.

Metering signal wires shall be No. 18 (16x30) or No. 16 (19x29), 2 conductor twisted pair shielded cable. The shield shall be 100 percent coverage aluminum-polyester tape with tinned-copper drain wire. Ground shield at load location only and as recommended by instrument manufacturer. Shield and drain wire shall be kept isolated from raceway and all metal parts of system. *The cable shall be Belden No. 8760, 8719 or equal by others.*

All electrical connections shall comply with the requirements of the National Electrical Code. All stranded conductor connections of No. 12 AWG and smaller shall utilize ferrule type crimp connectors to regain the integrity of solid core wire. All electrical connections No. 8 AWG and larger shall be made by a pressure plate or wire clamp type connection. All connectors shall be properly sized to match the wire and terminals size.

Where more than three power or lighting wires are installed in one conduit, they shall be derated in accordance with the National Electrical Code. All wire sizes specified herein, are based on not more than three (3) power or lighting wires in a conduit.

2.3 CONDUIT

All conduit installed for the Pump Station shall be aluminum rigid conduit unless specified otherwise.

Conduits run concealed shall be 1-inch size minimum. All other conduit shall be a minimum of 3/4 inch. All conduit sizes shall be one size larger than required by the National Electrical Code for the number and size of conductors installed.

All underground electrical conduits to be Schedule 80 PVC, concrete encased, red dye, with detectible marking tape buried 12” above concrete encasement. Transition to Aluminum Rigid Conduit (ARC) at 6” below grade, ARC to be coated with bitumastic material where in direct contact with earth. All threaded ARC joints to be coated with Moalox Anti-Oxidant Compound.

Conduit fittings shall be of the threaded type with aluminum metal bodies, and rust or corrosion resistant protective coating. All covers shall be aluminum and shall have gaskets of a type approved by the Owner. All conduit terminations shall be Myers Hub type or equivalent, shall be cast aluminum, have tapered threads, and all joints shall be watertight.

Expansion fittings shall be OZ Type "AX" with Type "BJ" bonding jumper, Crouse Hinds Type "XJ" with bonding jumper, or equal.

All conduit and equipment installed shall conform to the requirements for installation in the designated hazardous area as described in Article 500, 501 and 502 of the National Electrical Code. *Seal fitting shall be Series EYS by Appleton Electric Company, Series EYS by Crouse Hinds Company or equal by others.*

Conduit racks shall be stainless steel channel framing type by Unistrut, Globe Strut or equal. The basic member minimum size shall be the 1-5/8 inch x 1-5/8 inch x 12 Ga. channel with accessories as required. Support channels, bolts and nuts, and all accessories shall be stainless steel. Anchors to concrete shall be 304 stainless steel expansion type.

2.4 OUTLET BOXES, JUNCTION BOXES, PULL BOXES AND FITTINGS

All outlet boxes, junction boxes and pull boxes are to be 300 series stainless.

All boxes installed in concrete or masonry shall be deep type with a total minimum box depth of 3-1/2 inches, so concealed conduits entering sides of boxes can clear steel reinforcing rods.

All boxes shall be sized for at least the maximum number of wires which are allowed by these specifications in the conduits leading up to these junction boxes. All boxes shall have removable gasketed covers and shall be watertight. **ALL COVER FASTENING SCREWS SHALL BE STAINLESS STEEL.** All conduit entrances shall be sealed watertight and link sealed if penetrating a structure below grade.

All outlet boxes shall be at least 2-1/2 inches deep, single gang or multigang type and of a size to accommodate the devices required. *Surface mounted outlet boxes in non-hazardous locations shall have exterior mounting feet, shall use only single gang covers, and shall be Crouse Hinds No. FD01, FD02, FD03, Adalet FD0, FD2, FD3 or equal.* All cover plates shall be single gang type, even on multigang boxes, and shall be stainless steel metal covers with neoprene gaskets and stainless steel fastening screws. All boxes, fittings and supports shall also meet the requirements for Conduit. All exposed metal items such as nuts, bolts, supports, must be made of approved stainless steel material.

The Contractor shall furnish and install, at the pump station wet well, one (1) junction box as detailed on standard detail S5.1.4. The junction box shall have minimum 100 amp terminals for motor terminations and minimum 25 amp terminals for thermal and moisture detection *100 ampere terminals shall be equal to Allen Bradley 1492-CD2. 25 ampere terminals shall be equal to Allen Bradley 1492-F1.*

2.5 GROUNDING

Main grounding conductors, grounding electrode conductors and main bonding jumpers shall be no smaller than #3/0 stranded insulated copper cable, annealed, with no less than nineteen (19) strands in the cable. Connections to equipment shall be made with approved extra heavy copper solderless connectors.

2.6 STATION GROUNDS

Ground rods shall be ¾ inch diameter by 10 feet long. They shall have a heavy exterior layer of non-porous, pure copper, inseparably molten welded to a high carbon steel core. They shall have a rolled scar-resisting surface. Both ends of the rod shall receive the same heavy coating of copper as the body of the rod. The driving end of the rod shall be chamfered and the point shall be machined smooth, to aid in driving.

2.7 120 VOLT SWITCHES, RECEPTACLES AND COVER PLATES

Switches for lighting circuits shall be rated at 20 amps, 120 volts, and shall be by General Electric or Hubbell as listed below or equal.

Service	General Electric No.	Hubbell No.
Single Pole	GE5951-2	1221-I
Three Way	GE5953-2	1223-I
Four Way	GE5954-2	1224-I

Cover plates for switches installed only in flush mounted boxes, where a weatherproof cover plate is not required, shall be stainless steel flush mounting Type No. 93071 through 93076 by General Electric, Hubbell or equal by others, as required. Cover plates for switches installed in all surface mounted boxes and flush mounted where a weatherproof cover plate is required, shall be cast metal single gang type with gaskets for a NEMA 4 Type installation, Crouse Hinds No. DS-185 or Adalet No. WSL or equal by others.

All lighting circuit receptacles shall have NEMA 5-2OR configurations. *Receptacles installed in all flush mounted boxes where a weatherproof cover plate is not required shall be duplex, grounded, 20 ampere, 125 volt receptacles General Electric GE0526-C, Hubbell No. 53CM62 or equal by others, with stainless steel cover plates, General Electric 93101, Hubbell No. 93101 or equal by others. Receptacles installed in all flush mounted boxes where a weatherproof receptacle is required and in all surface mounted boxes, shall be the same as above with single gang type cast metal self closing spring door cover plates and gaskets meeting OSHA, NEC and UL standards for use in wet locations, Course Hinds No. WLRD-1 or equal by others.*

Ground fault circuit interrupter (GFCI) duplex receptacles shall have NEMA 5-15R configurations. The receptacles shall conform to UL Standard 943 for Safety, Class A. *The receptacles shall be Arrow-Hart No. 1591, Hubbell No. GF-5262 or equal by others, with stainless steel cover plates, Arrow-Hart No.97061, Hubbell No. S-26 or equal by others.*

2.8 CIRCUIT BREAKERS

Electrical circuits shall be protected by molded case circuit breakers. Each pole of these breakers shall provide inverse time delay overload protection and instantaneous short-circuit protection by means of a thermal-magnetic element. Magnetic only, molded case circuit breakers, may be used only in three phase combination motor controllers. The minimum interruption ratings of the circuit breakers shall be at least equal to the available short circuit at the line terminals.

The breakers shall be operated by a toggle type handle and shall have a Quick-made, Quick-break overcenter switching mechanism that is mechanically trip free from the handle. Tripping due to overload or short circuit shall be clearly indicated by the handle automatically assuming a position mid-way between the manual ON and OFF positions.

Breakers must be completely enclosed in a molded case. Terminals shall be listed with Underwriter Laboratories suitable for use with copper cable. Circuit breakers shall be listed with Underwriters' Laboratories, Inc., and conform to the requirements of NEMA Standard Publication No. AB1-1975 and meet the appropriate classifications of Federal Specifications W-C-375b.

The circuit breakers shall be the General Electric or Westinghouse Types listed below, or equal by others.

West. Type	G.E. Type	Max. Amps.	Type Trips	Interrupting Rating Sym.RMS Amps		
				120 V	208/240V	480V
BAB	THQB	100	N	10,000	10,000	-
QBGF	THQB-GFCI	30	N	10,000	-	-
EB	TEB	100	N	10,000	10,000	-
FDB	TED	150	N	-	18,000	14,000
FD	THED	150	N	-	65,000	25,000
JD	TFK	225	IA	-	25,000	22,000
HMCP*	TEC/TFC/TJC	600	NA	-	25,000	25,000

(I) Interchangeable Trips

(N) Non-interchangeable Trip

(A) Adjustable Magnetic Trips

* Magnetic only for individual Motor Circuits only.

2.9 THREE PHASE MOTOR CONTROLLERS

Three phase motor controllers shall be magnetic coil operated, horsepower rated equipped with 3 overload elements and a fused pilot control transformer for 120V pilot control. All controllers shall be combination type controllers with circuit breakers used in combination type controllers conforming to Section 2.8, Circuit Breakers, of these specifications. All combinations of motor size, fuse size, circuit breaker size, overload size and contractor size shall conform to the National Electrical Code.

Control power transformers shall be provided in accordance with section 2.11.

Overload relays shall be manually reset from outside the enclosure by means of an insulated bar or button. The relays shall be of the temperature compensating type and have heaters sized to coordinate with the actual motors being controlled.

The three phase motor controllers shall be Siemens NEMA rated not IEC, or equal by others.

2.10 PILOT CONTROL DEVICES

Pilot control devices shall be furnished and installed in the pump control panel of Section 2.11 of these specifications for the proper functioning of each piece of utilization equipment.

Pushbuttons, selector switches and pilot lights shall be heavy duty, oil tight Allen Bradley Bulletin 800T, General Electric Type CR2940, Square D Type K, Westinghouse ElectricType PB2 or equal by others. Pilot lights shall be push-to-test transformer type (120 VAC x 6 VAC) LED lights, color as described in section 2.11. All pilot control devices shall have screw terminals for wire connections. All pushbuttons, selector switches and indicator lights shall have custom lettered, jumbo size legend plates with black engraved lettering on a white background.

Relays shall be sized for the load conditions. *Light duty relays shall be general purpose plug in type mounted on heavy duty sockets, Finder Type 46 Series or equal by others.* Heavy duty relays shall be used for motor control circuits and similar duty. *Heavy duty relays shall have 10 amperes rated 300 volt A.C. convertible contacts and shall be Allen Bradley Bulletin 700 Type N, Square D Class 8501 Type GO-40, or equal by others.* All relays shall have 120 VAC coils.

2.11 PUMP CONTROL PANEL

The Contractor shall furnish and install a pump control panel for pump and equipment control. The enclosure shall be constructed in accordance with JIC Electrical Standards for Mass Production Equipment, except as modified herein.

1. The pump control panel shall be manufactured by a UL panel builder and the assembly shall bear a serialized UL label for "**Enclosed Industrial Control Panels**". Listing for open style industrial control panels or an assembly of listed or recognized components shall not be acceptable.

A. Enclosure

The custom made enclosure shall be of formed type construction with welded seams and corners throughout. All exposed metal shall be hand selected for finish and to be level. The enclosure shall be constructed of 12 gauge, or heavier, NEMA 4X 300 series stainless steel, powder coated White, Ivory, or an approved lighter color and shall have a No. 6 finish. All welds shall be ground smooth and finished to give a uniform appearance to the entire enclosure.

The enclosure shall have two uniquely gasketed, overlapping doors which eliminate the need for a center post. The door gaskets shall be oil resistant, attached with an oil resistant adhesive and held in place with retaining strips. The doors shall be supported with heavy duty full length piano type hinges and shall have an oil tight pad lockable handle with three point latching mechanism.

The enclosure shall have a drip edge/rain guard along the entire top front of the door opening side of the control panel.

All hardware on the enclosure, hinges, pins, clamps, nuts, bolts, washers, screws, etc., shall be stainless steel. All components inside the enclosure shall be mounted on panels which are bolted to the enclosure with collar studs. All interior panels shall be painted a high gloss white. The enlosure shall be provided with a corrosion-resistant drawing pocket on the door interior.

The Contractor shall furnish a control panel of the size required to house the manufacturer's equipment supplied and all other electrical components installed in the enclosure as approved by the Owner's Representative.

The control panel shall be designed so that all conduit enters and leaves through the bottom or lower rear of the unit unless otherwise noted. All holes for installation of conduit shall be sealed watertight after equipment installation.

All electrical equipment and controls for the pump station shall be mounted inside the pump control panel enclosure. There shall be no equipment mounted on the external faces of the enclosure with the exception of the control power transformers, unless approved otherwise. All access to equipment shall require the opening of the enclosure doors. The equipment mounted inside the enclosure shall include the normal source circuit breakers, control circuit components, SCADA components, surge protection, a GFCI receptacle and the motor controllers and their associated circuitry for the pump station pumps.

The pump control panel shall include the following controls for duplex/triplex pump installations mounted on a two part, fully hinged, ¼ turn closure inner door: A Hand-Off-Automatic selector switch, a green running indicator light and a red pump seal failure indicator light for each pump and a red flashing LED high wet well level alarm indicator light mounted on the side of the panel. Enclosures housing Variable Frequency Drives shall have forced air, thermostatically controlled ventilation installed.

The enclosure shall have a ground bus for connection of all ground wires. All relays, timers, pushbuttons, selector switches and pilot lights shall conform to the requirements of Section 2.10 of these specifications. All legend plates shall be custom lettered as approved by the Owner's Representative.

B. Wiring

Panel wiring shall be general purpose open type with all connections clearly identified and with all connections external to the panel connected to terminal strips mounted on a subpanel at the lower rear of the enclosure. All wires shall be numbered and labeled at each termination and at each junction of the wire. Internal panel wiring shall be single conductor, stranded copper, rated 600 volts at 75^{o}C, Type

MTW for control circuits and THHN/THWN for power wiring. Wire size shall be No. 14 AWG minimum or larger if load requirements so dictate. All dc signal wiring shall be two-conductor shielded cable, size no. 16 AWG, equal to Belden No. 8719. Separate ac wiring from dc wiring. All wiring terminations shall be by means of insulated solderless pressure type connectors equal to T&B Sta-Kon, Vaco, or Ideal terminals.

All wires shall terminate at terminal strips. The terminal strips shall be screw terminal type with barriers between the screws and shall be rated for use at 600 volts. The ac terminals shall be separated from the dc terminals. Twenty percent spare terminals shall be provided for both ac and dc terminals. All terminals shall have a terminal labeling surface and all terminals shall be labeled with the appropriate wire number. The terminals shall be Allen Bradley Catalog Number 1492-CD8, G.E. CR151A3, or equal by others. Soldered type connections are not acceptable.

All components in the enclosure shall be completely wired to the terminal strips within the enclosure, before being delivered to site. Field work shall consist of setting the enclosure in place and making field wiring connections to the terminal strips.

All wiring shall be run along vertical or horizontal routes and bundled together to present a high quality design and neat appearance. Angled runs are not acceptable. All parallel runs of wire shall be grouped together and installed in vinyl plastic lay-in wiring ducts or tied together in bundles with nylon cable ties where wiring ducts cannot be used. Wiring to equipment mounted on doors or where movement of the equipment will take place shall be installed in nylon spiral wrapping sheaths equal to Panduit Type T or Voltrex Type HWN. All wiring ducts and cable ties shall be solidly bolted or screwed into place where they are secured to the panel. Adhesive type mountings are not permitted. Lay-in wiring ducts shall have snap-on covers and slots in the duct sidewall for easy wire insertion and shall be equal to Panduit Type E and Voltrex Type WDS.

C. Control Transformers

The pump control panel shall have two (2) control power transformers, one (1) for pump control circuits and one (1) for generator 120 volt power loads. Transformers shall be mounted outside of the pump station control panel in NEMA 3R enclosures unless otherwise noted. The transformer for pump and generator control circuitry shall have circuit breaker protection in both the primary and secondary circuits and shall include neutral bonding on the secondary side of both transformers. Circuit breakers shall also be included to protect the circuits for the GFCI receptacle, the engine block heater, the battery charger, the enclosure heater and one spare circuit.

D. Variable Frequency Drives

Where required by the Owner, provide a variable frequency drive (VFD) for each pump. VFD shall be used for conversion of single phase power to 3 phase power.

E. Surge Arrestor

Provide a surge arrestor on incoming single –phase and 3-phase power.

F. Climate Control

The enclosure shall have a forced air type space heater, 120-volt with thermostat to control condensation in control panel. The enclosure temperature shall be maintained at 40 degrees Fahrenheit (° F.) in ambient temperatures as low as -10° F. Thermostat controlled panel ventilation shall also be supplied. Ventilation shall consist of the following components, size and quantity to be determined by enclosure requirements. No less than (1) 120v 6" Axial fan, (1) 120vac din mount thermostat, (1) ea. inlet and outlet filter with stainless steel fan shroud.

G. Power Monitor

Provide a power-monitoring relay in control panel for phase-failure protection. Include the following items:

1) 3-Phase Line Voltage Phase Monitor: SymCom Motorsaver Model 460
2) 1-Phase Line Voltage Phase Monitor: Finder 46.52.8.120.0040

2.12 SCADA SYSTEM

It shall be the responsibility of the Contractor to furnish and install supervisory control and data acquisition (SCADA) equipment compatible with the receiving equipment operated by the Owner.

All wiring and conduits required to connect the SCADA equipment with the alarm contacts or switches shall be furnished and installed by the Contractor as specified herein and in accordance with the **Utility Department direct coordination and review.**

SCADA equipment required at each pump station installation shall include, but not be limited to, the following items and all associated wiring and connections:

Quantity	Description	Manufacturer	Model	Part #
1	PLC	Allen Bradley	Micrologix 1400	1766-L32BWAA
1	Verizon Network LTE Enabled SCADA Radio	Sierra Wireless	RV50	1102555
1	Antenna	Digital Antenna	Powermax	295-PW
1	Antenna Surge Protector	Times Microwave Systems		LP-STRL-NFF
1	12VDC Power Supply	Array Electronic Co.		SP-12AS

2.14 ODOR CONTROL CHEMICAL FEED SYSTEM

Contractor shall supply and install one (1) odor control chemical feed system at each lift station site in accordance with Section 3302, Odor Control Chemical Feed and Storage System.

2.15 EMERGENCY STANDBY GENERATOR

The Contractor shall furnish and install a diesel powered emergency standby generator capable of continuous service at rated output for the duration of any utility power failure. It shall be the responsibility of the Contractor to check and coordinate all appurtenances required by this system, to provide all such appurtenances whether or not shown and specified, and to check and coordinate all construction required to complete the system. The fuel tank will be sized with a MINIMUM 36 hour operating capacity. Transfer switches are to be mounted in a separate, minimum NEMA 3R rated, enclosure. The diesel powered emergency standby generator shall be manufactured by Kohler or approved equal. The generator enclosure shall be sound-attenuated.

The diesel powered emergency standby generator shall include a five (5) year full parts and labor warranty, including travel. Spare parts shall include spare filters and block heater.

For stations specifically noted to not receive a standby generator, the Contractor shall furnish a double throw NEMA 3R safety switch with cam lock connectors made by Cutler Hammer, or approved equal, in lieu of an automatic transfer switch.

PART 3 – SUBMITTALS

3.1 GENERAL

Before beginning the electrical work, the Contractor shall submit to the Owner's Representative, for approval, the following data:

1. Wiring diagrams and conduit layout drawings showing sizes, quantities and locations of all conduits, conductors and all other electrical equipment being installed. All panel components shall be clearly labeled and identified. All wire numbers shall be clearly shown and sufficiently explained on shop drawing legends.

2. Plans, specifications, drawings and full descriptions of all equipment to be furnished, with complete wiring diagram and equipment data. This includes all components inside the major items of equipment and shall include any and all drawings or instructions required by someone installing, adjusting and/or operating this equipment.

3. Shop drawings shall include name plates, circuit labels and wording for review and approval by the Owner's Representative.

Each piece of equipment shall have its required drawings approved prior to the manufacture of the equipment.

Final as-built wiring diagrams and conduit installation drawings shall be made by the Contractor in triplicate and given to the Owner's Representative prior to the final acceptance of the facility. These drawings shall accurately show the actual location of all conduits, boxes and other electrical equipment and the number and intended use of all wires.

3.2 SPARE PARTS

All spare parts recommended by the manufacturers of the various items of equipment in any of their literature shall be furnished by the Contractor and turned over to the Utility Department. In addition, all parts, equipment and/or supplies necessary to keep the equipment operating successfully for the first year of operation shall be furnished by the Contractor and turned over to the Water Resources Department. Spare parts supplied by the Contractor shall include the following:

1. One (1) spare fuse for each and every fuse in service up to a maximum of ten (10) for any one (1) size fuse.
2. One (1) spare pilot light bulb for each and every pilot light bulb in service.
3. One (1) spare unit for each ten (10) or less of each size and type of each of the following components furnished: Control transformers, pilot light assemblies, switch contact blocks, relay contact cartridges, selector switch assemblies and pushbutton assemblies.
4. One (1) spare starter. If the lift station includes Variable Frequency Drives (VFD's), a spare VFD shall be supplied.

3.3 OPERATION AND MAINTENANCE (O&M) MANUALS

Three (3) sets of complete bound instruction books for the Emergency Standby Pumping and all other Electrical Equipment shall be furnished to the Utility Department. Each book shall contain complete and detailed operating and maintenance instructions on all components of the equipment. Manuals which describe general information on the manufacturer's complete line of equipment will not be acceptable.

3.4 PERMITS

Unless already obtained by the Owner, the Contractor shall obtain all necessary permits required to perform the work required for the Lift Station. This includes local Building Permits and State Fire Marshall Permits for fuel storage tanks. Submit copies of all permits, applications, and approvals to the Owner's Representative. The Contractor shall coordinate all permit inspections necessary to comply with local, state, and federal regulations and shall be responsible for any re-inspection fees.

3.5 POWER SYSTEM STUDIES

The Contractor shall provide a breaker coordination study, an arc flash study, and arc flash labels for all equipment modified, and all new equipment provided under this Contract. Studies shall be performed by a registered professional engineer registered in the state of Ohio.

The Contractor is responsible for providing all required information to the preparer of the breaker coordination study and arc flash study.

PART 4 – EXECUTION

4.1 GENERAL

The Contractor shall furnish all necessary labor, material, tools, and equipment required in the installation of the Sanitary Sewer Pump Station, except as identified in Section 3300 – Sanitary Sewer Pump Station, General. This work includes all labor, materials, equipment, services and incidentals required to construct, install and place into satisfactory service, the complete electrical systems and all electrical works as specified. All work shall be completed as specified, as shown on the Contract Drawings and as directed by the Owner's Representative.

4.2 WIRING

All wires shall be run in aluminum rigid conduits, unless otherwise specified herein.

All conductors shall be identified by circuit number and phase at each end, at each termination and at each splice location by a permanent non-rotting band over the insulation.

Where possible, install cable continuous, without splice, from termination to termination. Where required, splice in junction box using terminal boards. Splices in conduits will not be allowed.

Install instrumentation cable conduits as far as possible from power cable conduits.

4.3 CONDUIT

All conduit joints shall be cut square, threaded, reamed smooth and drawn up tight. Bends or offsets shall be made with standard conduit ells, field bends made with an approved bender or hickey, or hub-type conduit fittings, all conforming to the requirements of the National Electrical Code Table 346-10 (a), for the minimum bend radius allowed.

The conduit shall be installed in straight runs so far as possible and in no case shall the Contractor install more bends than allowed by the National Electrical Code without providing a pull box or access fitting. The conduit shall be so installed that any water which may collect in the pipe will drain to the nearest pull box or conduit fitting, if possible. A conduit drain fitting shall be installed at this low point, Crouse-Hinds ECD or approved equal.

Conduits shall be continuous from outlet to outlet, from outlets to cabinets, pull or junction boxes and shall be secured to all boxes with locknuts, bushings and O-rings in such manner that each system shall be waterproof and electrically continuous throughout. Conduit ends shall be capped to prevent entrance of moisture and foreign materials during construction. All conduits shall have a ground wire installed in the conduit. See Section 4.5, Grounding, for ground wire size.

Connections to existing conduits and other places where it is impossible to make a threaded connection shall be by waterproof threadless connections. A bonding jumper wire shall be connected across this connection. The bonding jumper wire shall be fastened at each end with stainless steel hardware. *Under no condition will a set screw type of union be allowed.*

All rigid metal exposed conduits 1-1/2 inches and smaller shall be supported at 5 foot centers or less and all conduit larger that 1-1/2 inches shall be supported at 10 foot centers or less.

Conductors of different voltage levels shall be in separate conduits except where approved otherwise. 460 volt circuits, 230 volt circuits, 120 volt circuits, signal, telephone, intercommunication, analog metering circuits, dc pulse circuits, and all other circuits shall each be in separate conduits unless approved otherwise.

Expansion fittings shall be installed in long runs of exposed conduits, in any condition where thermal expansion and contraction could cause misalignment of the conduit, and in a run of conduit, whether in concrete or surface mounted, where the conduits cross structural expansion joints. See Section 2.3 for approved expansion fittings and bonding jumper.

All wiring installed underground shall be installed in Schedule 80 PVC conduit and the conduit encased all around in 4 inches of concrete. All underground conduit shall be at least 24 inches below the surface. All underground electrical conduits to be Schedule 80 PVC, concrete encased, red dye, with detectible marking tape buried 12” above concrete encasement. The underground conduit encasement shall be doweled into the structural concrete with a minimum of four (4) #5 x 4 foot long reinforcement bars per conduit. Where underground conduits enter a structure, building or tank, a watertight flexible connection shall be provided and a pull box or fitting shall be mounted on the inside face of the wall. Water drainage out of pull boxes at underground conduit entry shall be provided. Wiring and terminals shall be placed away from water. An insulated ground wire shall be installed in all underground conduits. All metal parts of the underground conduit system and all equipment shall be grounded. See Section 4.5, Grounding, for ground wire size.

For individual exposed conduits passing through new walls or slabs, install sleeves, unless specified otherwise, in the wall or slab, and seal watertight between the conduit and sleeves after conduit installation. Wall sleeves shall be aluminum pipe with waterstop collar, unless shown or specified otherwise. Watertight seals shall be mechanical type seals. All pipes that pass through walls and slabs shall be sealed to fill the annular space between the pipe and the cored hole through which the pipe

passes. All metal parts of the seal shall be 300 series stainless steel, all links shall be EPDM rubber, and pressure plates shall be Delrin. All seals shall be watertight to 40 feet of head. Pipe seals shall be Link-Seal, service designation S (corrosive service), as manufactured by Thunderline Corporation, or approved equal.
Concealed conduits in poured concrete walls or slabs shall be run in the center of the wall or slab for maximum concrete cover over the conduit. Concealed conduits shall be accurately measured for location prior to being covered and this location marked on record drawings for future reference.

All conduits shall run parallel to building lines when installed within buildings, or other concrete structures, and parallel to plant structures when installed outside of structures underground, unless approved otherwise. All conduits, boxes, fittings, equipment and other material shall be supported by pipe straps or suitable clamps or hangers attached to the elements of the building structure to provide rigid installation. All conduits, fittings and enclosures shall be spaced at least 1/4 inch away from walls and slabs. Spacers shall be stainless steel, PVC or nylon.

4.4 OUTLET BOXES, JUNCTION BOXES, PULL BOXES AND FITTINGS

The Contractor shall furnish and install all outlet boxes, junction boxes, pull boxes and fittings where specified herein, and/or where required. All boxes, fittings and supports shall also meet the Conduit requirements of this specification. ***All boxes, mounting anchors, cover plates, fastening screws, bolts, nuts, etc. shall be stainless steel.***

Junction boxes shall be securely mounted to the building structures with supporting facilities independent of the conduits entering or leaving the boxes. All surface mounted boxes installed against concrete or masonry shall be installed with a 1/4 inch space between the box and the mounting surface. Spacers shall be stainless steel, PVC or nylon.

Conduit fittings shall be of the threaded type with cast or malleable metal bodies and rust or corrosion-resistant protective coating. All covers shall be cast type and shall have gaskets of a type approved by the Owner. Hubs shall have tapered threads and all joints shall be tight.

Provide terminal blocks for cable termination in all junction boxes. All conduit and cable entrances in boxes shall include plastic insulating bushings for wire protection.

Pump removal for the Pump Station Wet Well shall only require pump cable disconnection at the pump junction box. All conduits running from the Pump Control Panel of Section 2.11 to the pump and level control junction boxes shall be sealed with conduit seal fittings at the junction boxes.

4.5 GROUNDING

Lighting system neutrals, neutral taps of all "Wye" connected transformers, and all non-current carrying parts of electrical equipment such as motor frames, conduits, cabinets, etc., shall be solidly grounded to the Station Ground System in accordance with Article 250 of the National Electrical Code.

All conduit systems shall be electrically continuous from the service equipment. All conduit leaving the service equipment shall be grounded to the service equipment.

All conduits shall have ground wires installed in the conduit. All metal parts of the raceway systems shall be connected to this ground wire with copper clamps, straps or ground bushings. The size of the ground wire shall be the same as the phase wires, unless shown otherwise, except not smaller than #12 for all 120/240 volt circuits or #10 for all higher voltage circuits. This size of the ground wire for multi-circuited conduits shall be not less than the total cross sectional area of the phase wires connected to the maximum circuited system phase, within the conduit, unless shown otherwise. For example, if there are 3-A phase wires and 2-B phase wires in a conduit, the ground wire size shall be three times the area of A phase wires, not five times the area of all phase wires.

Grounding electrode conductors, only, may be bare copper cable, but all other grounding conductors shall be insulated, of adequate size installed in conduit, unless approved otherwise. Install separate main conductors for all dc and instrumentation grounds.

4.6 STATION GROUNDS

In order to furnish an adequate station ground for the electrical and electronic equipment for the Pump Station, the Contractor shall install and connect the grounding system as required by these specifications. The Contractor shall install at least the number of ground rods to provide a resistance of less than 5 ohms between the station ground and earth. The grounding system shall be tested in accordance with the Testing section of these specifications.

4.7 SWITCHES, RECEPTACLES AND COVER PLATES

The Contractor shall furnish and install all switches and receptacles with cover plates as required. They shall be installed in boxes as called for under Sections 2.4 and 4.4, Outlet Boxes, Junction Boxes, Pull Boxes and Fittings.

Bonding jumpers shall be installed between the receptacle ground screws and outlet boxes on all receptacles. Install receptacles, except ground fault circuit interrupters, with ground pole in the down position.

4.8 THREE PHASE MOTOR CONTROLLERS

Individual layout sketches shall be supplied and unit wiring diagrams shall be posted inside each door. Auxiliary devices and contacts for motor space heaters, remote status signals and interlocks necessary for the proper functioning of each piece of utilization equipment shall be furnished complete and wired to the terminal blocks in each controller enclosure. All wiring and cable shall be tagged at all terminations. Pilot control devices shall conform to Section 2.10 of these specifications.

The motor controllers for non-hazardous locations shall be installed in NEMA 4 stainless steel enclosures except those controllers installed in Motor Control Centers or pump control panels.
Securely fasten enclosure to wall or other mounting surfaces. Where local wall is not available, provide stainless steel supports to rigidly support equipment reasonably close to motor. Space at least 1/4-inch from wall with stainless steel, PVC or nylon spacers. Use stainless steel materials for miscellaneous and mounting hardware.

4.9 PUMP STATION SERVICE ENTRANCE

The Contractor shall furnish and install all appurtenances necessary to bring power from the power company overhead lines to the Pump Control panel, located at the Pump Station.

The Contractor shall furnish and install complete, a new service power pole with anchoring guywire to receive the overhead lines from the power company distribution system, and all cable, cable terminations, conduit and other appurtenances necessary to bring the power from the overhead lines down the pole and underground to the Pump Control panel. The Contractor shall also install the power company's metering socket. The power company will furnish the overhead lines from their distribution system to the new service power pole, the metering socket and the meter.

The complete installation of the service power pole and the service from the pole to the Pump Control panel shall meet all the requirements of the power company. It shall be the responsibility of the Contractor to contact the power company and to coordinate the work involved in the service entrance installation.

Note: the electrical meter and equipment shall be mounted on stainless poles. Treated lumber stands or supports will not be acceptable. The only exception to this is meters mounted directly to service poles.

4.10 PUMP CONTROL PANEL

The Contractor shall furnish and install a pump control panel for pump and equipment control. The enclosure shall be constructed in accordance with Section 2.11 of these specifications. All holes for installation of conduit shall be sealed watertight after equipment installation.

For Duplex Pump Stations, the pump station operation shall be as follows: As the level in the Pump Station Wet Well rises the lead pump will start after a time delay and will remain on until the level in the wet well falls to a set stop level. If the level in the wet well continues to rise, the lag pump will start after a time delay and both pumps will remain on until the wet well level falls to the set stop level. If the wet well level continues to rise a high level alarm indicator light shall become illuminated. Alternation of pump status as to lead or lag pump shall occur at the end of each operating cycle. High motor temperature or motor overload shall cause the respective pump to stop and illuminate its red overload indicator light.

The operation of a Triplex Pump Station shall operate as follows: As the level in the Pump Station Wet Well rises the lead pump will start after a time delay and will remain on until the level in the wet well falls to a set stop level. If the level in the wet well continues to rise, the lag pump will start after a time delay and both pumps will remain on until the wet well level falls to the set stop level. If the wet well level continues to rise, the lag-lag pump will start after a delay and all three pumps will remain on until the wet well level falls to the set stop level. If the wet well level continues to rise a high level alarm indicator light shall become illuminated. All three pumps shall remain on until the level falls to the set stop level. The selected lead and lag pumps shall alternate at this time.

All instruments and equipment inside the panel shall be permanently tagged. All panel components shall be clearly labeled and identified on shop drawings.

All wiring shall be run along vertical or horizontal routes and bundled together to present a high quality design and neat appearance. Angled runs are not acceptable. All parallel runs of wire shall be grouped together and installed in vinyl plastic lay-in wiring ducts or tied together in bundles with nylon cable ties where wiring ducts cannot be used. Wiring to equipment mounted on doors or where movement of the equipment will take place shall be installed in nylon spiral wrapping sheaths equal to Panduit Type T or Voltrex Type HWN. All wiring ducts and cable ties shall be solidly bolted or screwed into place where they are secured to the panel. Adhesive type mountings are not permitted. Lay-in wiring ducts shall have snap-on covers and slots in the duct sidewall for easy wire insertion and shall be equal to Panduit Type E and Voltrex Type WDS. First class workmanship shall be expected in the completed installation.

The enclosure shall have 120 volt thermostatically controlled heat and ventilation as described in section 2.11. The enclosure shall have a ground bus for connection of all ground wires.

All controls, pushbuttons, selector switches and pilot lights shall conform to the requirements of Section 2.10 of these specifications. All legend plates shall be custom lettered as approved by the Owner's Representative.

Upon completion of the control panel programming of the PLC will be completed by the Utility Department.

4.11 SAFETY SIGNS

Self-sticking marking labels shall be furnished and installed on each piece of electrical equipment stating the maximum voltage level involved with that piece of equipment. The labels shall be at least 2" high and shall include the following: 120 VOLTS; 240 VOLTS; 480 VOLTS; 2300 VOLTS: 4160 VOLTS; 13,000 VOLTS. Labels required shall also include arc flash analysis labels in accordance with Section 3.5 of these specifications.

4.12 ENGRAVED NAMEPLATES AND CIRCUIT LABELS

All electrical motor starters, disconnect switches, manual starter switches, pushbutton stations and similar equipment operating components shall be provided with permanently mounted, laminated engraved nameplates. The nameplates shall describe the motor or equipment function and give the circuit number. The nameplates shall be mounted by means of stainless steel machine screws into drilled and tapped holed to meet NEMA 4 standards.

All other electrical appurtenances, switches, outlets, pull boxes, etc., except conduit shall be labeled with the appropriate circuit number such as L-4 or P-5. These labels shall be permanently attached embossed type labels. All nameplates, circuit labels and wording on them shall be approved by the Owner's Representative.

4.13 PAINTING

All interior and exterior surfaces of equipment enclosures, except stainless steel enclosures and hardware, shall be thoroughly cleaned after fabrication, completely bonderized and finish painted at the factory. All interiors shall be white. Touch-up painting shall be done after installation.

PART 5 – TESTING

5.1 GENERAL

The Contractor is responsible to provide all tools, materials, gauges, and water that are necessary to complete the testing as specified herein. All testing must be witnessed and approved by the Owner's Representative.

5.2 WIRING

Test each electrical circuit after permanent cables are in place to demonstrate that the circuits and connected equipment perform satisfactorily and that they are free from improper grounds and short circuits. Any cable which fails the insulation tests or which fails when tested under full load condition shall be replaced with a new cable for the full length. Contractor to provide all test instruments.

5.3 STATION GROUNDS

The Contractor shall test, in the presence of the Owner's Representative, the resistance to ground with a "Meg" ground tester using two temporary reference grounds versus the permanent grounding cable.

The reference grounds shall be a minimum of 50 feet and 100 feet, respectively, from the permanent ground rods.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the lump sum unit price bid for Item 3301 – Sanitary Sewer Pump Station, Electrical. Any additional materials required to construct, install and place in satisfactory service, the complete electrical systems, shall be furnished and installed as part of this item. All electrical equipment furnished under this section shall meet all requirements of Section 3301-Sanitary Sewer Pump Station, Electrical.

All wiring from the pumps to the pump junction boxes, as shown on the drawings, shall be furnished under Section 3300 – Sanitary Sewer Pump Station, General. All electrical connections shall be performed as part of Section 3301 – Sanitary Sewer Pump Station, Electrical.

The Contractor also has the option to bid both the General work and Electrical work (Sections 3300 and 3301). Bid options are as follows:

Item	Unit	Description
3301	Lump Sum (LS)	Sanitary Sewer Pump Station, Electrical
3300 / 3301	Lump Sum (LS)	Sanitary Sewer Pump Station, Complete

END OF SECTION

SECTION 3302–ODOR CONTROL CHEMICAL FEED AND STORAGE SYSTEM

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for furnishing, installing, and placing into successful operation a chemical feed system. This system shall be complete and include chemical feed pump(s), feed control(s), liquid storage tank(s), and all piping and appurtenances required to feed odor control chemical into a wastewater collection system.

All components of the system shall be compatible with the conditions and chemicals which they are subjected to during the normal operation of the system. Compounds which the materials must be compatible with include, but are not limited to, 70-percent Calcium Nitrate in solution and hydrogen sulfide.

1.2 RELATED WORK

A. Section 3300 Sanitary Sewer Pump Station, General
B. Section 3301 Sanitary Sewer Pump Station, Electrical

1.3 SYSTEM DESCRIPTION

The system shall provide for bulk storage of odor control chemical and metering of the odor control chemical from the bulk storage tank to the wastewater collection system. The system shall contain controls as necessary to facilitate variation in feed rates over a 24-hr period.

1.4 WARRANTY

Standard One-Year Warranty: Unless otherwise stated below, Contractor shall warrant the work for a period of one year from the date established for partial utilization in accordance with the Substantial Completion of the project.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

Contractor shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including, but not limited to, structural, mechanical, and electrical work. Contractor shall also pay additional costs necessary for revisions of drawings and/or specifications by Engineer.

2.2 ODOR CONTROL CHEMICAL

Odor Control Chemical will be provided by the County as 70% Calcium Nitrate in solution.

2.3 CHEMICAL STORAGE TANK

The chemical storage tank shall be constructed of Rotationally molded High-density cross-linked polyethylene (HDXLPE). No other materials of construction shall be acceptable. The tank shall have a bottom suction bellow style transition fitting provided and installed by the tank manufacturer.

1. The chemical storage tank shall have the following capacity and approximate dimensions (±5%)

Parameter	Chemical Tank
Normal Capacity	1,050 gallons
Diameter	6’-0”
Height	7’-3”
Empty Weight	221 lbs
Specific Gravity	1.90

2. Manufacturing:
    a. High-density cross-linked polyethylene tanks shall be manufactured by the rotational molding process in accordance with ASTM D 1998-93 Standard Specification for Polyethylene Upright Storage Tanks, Type 1 only. Rotational Molding shall be defined as a three-stage process consisting of loading the mold with powdered resin, fusing the resin by heating while rotating the mold about more than one axis, and cooling and removing the molded article.
    b. Appearance. Type 1 finished vessel walls shall be free, as commercially practicable of visual defects such as foreign inclusions, air bubbles, pinholes, pimples, crazing, cracking, and delaminations that will impair the serviceability of the vessel.
    c. Dimensions and Tolerance. The vessel diameter shall be measured externally. The tolerances on the outside diameter, including out of roundness, shall be plus or minus 1 percent. Measurement shall be taken in a vertical position.
    d. Tank construction shall include molded graduated Gallon indicators.

3. Design Parameters:
    a. Hoop Stress: The vessels shall be designed with a hoop stress value no greater than 600 psi at 100°F with a safety factor of no less than 2, using the Barlow Formula for Calculating wall thickness.
    b. Wall Thickness: The minimum required wall thickness of the cylindrical shell at any fluid level shall be determined by the Barlow Formula. The wall thickness shall be based on the maximum temperature of the service.

4. Material:

a. Plastics: The molding powder used shall be Marlex CL-250 or CL-200 as manufactured by Phillips 66, or powders of equal physical and chemical properties.

i. The polyethylene shall preferably be virgin material. Any use of regrind, recycled, or reprocessed materials or combinations of such materials shall not rely upon the performance data of their original constituents, but must meet the requirements of this standard in its own right.

ii. The polyethylene shall have a stress-cracking resistance of 500 h minimum F50 in accordance with Test Method D 1693, Condition A, full-strength stress-cracking agent. The test specimens may be compression molded or rotationally molded. If compression molded, Procedure C of Practice D 1928 shall be followed for both types of polyethylene with a minimum platen temperature of 350°F (177°C). If it is cross linkable polyethylene the temperature shall be 390°F (197°C) and the platen shall be kept closed under full pressure for 5 minutes at the specified temperature in order to bring about the cross-linking reaction. If the test specimens are rotationally molded, the conditions for rotational molding shall be similar to the conditions used for molding a vessel from this polyethylene.

b. Fillers and Pigments. The plastic shall contain no fillers. All plastic shall contain an ultraviolet stabilizer at a level adequate to give protection for the intended service life of the vessel, minimum of 0.25%. This stabilizer shall be compounded in the polyethylene. Pigments must be compounded at the same time of resin manufacturer.

5. Material Characteristics: The nominal value for the properties of the materials shall be based on the molded parts:

Property	ASTM	Value	Units
Density	D1505	59 (0.937-0.944)	Lb/ft^3 (S.G.)
ESCR spec thickness 0.125”	D1693	900-1000	Hrs.
Tensile Strength Ultimate 2”/min.	D638 Type IV	2600	PSI
Elongation at break 2”/min.	D638 Type IV	450	%
Vicat Softening Temp.	D1525	255	Degrees F
Brittleness Temp.	D746	-180	Degrees F
Flexural Modulus	D790	100,000-110,000	PSI

6. Fittings:

a. All fittings, with the exception of the factory installed bottom suction (where applicable), shall be located on the tank top or dome. No other penetration of the tank sidewall shall be made.

b. Plastic fittings shall be “bulk-head” or “two-flange” style and shall be constructed of PVC. There shall be 4 bolts on any bolted flanges up to and including 3 inch, 8 bolts on fittings 4 inch to 8-inch diameter, and 12 bolts on 10-inch to 12-inch fittings. All bolts shall be all thread design with heads completely encapsulated in polyethylene. The polyethylene encapsulation shall fully cover the bolt head and a minimum of 1/4 inch of the threads closest to the bolt head. The polyethylene shall be color coded to distinguish bolt material: (Green-316 grade S.S., Red-Hastelloy "C", Blue-Monel, Black-Titanium). Each bolt shall have a gasket, which is on the inside of the vessel.
c. Openings that are cut in vessel to install fittings shall not have sharp corners. Holes shall have minimum clearance to insure best performance of fittings.
d. For all flanged connectors, the flange drilling and bolting shall be in accordance with ANSI/ASME B-16.5 for 150-psi pressure class straddling the principle centerline of the vessel.

2.4 CHEMICAL FEED PUMPS

Provide Gorman-Rupp GRI Pumps Single Bellows Pump, or approved equal, as shown on the following table. Each pump shall include motor, base, sealed bearings, flexible coupling and check valve filters.

Quantity	Manufacturer	Model No.	Bellow Size	Maximum Flow Rate (mL/min)	Maximum Discharge Pressure (psi)
1 + (1 spare)	Gorman-Rupp	15090-001	1.0”	50	40

Pump rate and maximum discharge pressures shall be in accordance with the table above.

1. The pump shall be self-priming capable of suction lifts, when dry, up to 7 feet, and with bellows full, they shall prime up to 20 feet.
2. Flow rate of pump shall be adjustable by (a) diameter of bellows, and (b) adjustment of stroke length.
3. Valves shall be installed to isolate the pump from suction and discharge lines to facilitate removal or replacement.
4. Pump suction and discharge shall be 3/8-inch ID polypropylene barbed connection for “T” tubing.

Pump construction shall conform to the following:

Material Reference	Material
Bellows	Polypropylene
Poppet Valves	EPT ®
O-rings	EPT ®
Springs	Hastelloy C

Pumps shall accept 120-volt AC, single-phase, 60 Hz incoming power and shall be powered from the motor control panel. The pumps shall be located in a NEMA 4X, 316 stainless steel enclosure.

2.5 PIPING AND APPURTENANCES

Piping and appurtenances shall conform to the following:

1. All discharge piping shall be standard 3/4-inch minimum, cross-linked polyethene (PEX), unless otherwise noted on the drawings. PEX piping shall be installed in Schedule 40 PVC piping as shown on the Drawings.
2. All chemical feed seals shall be compatible with the chemicals to be used in the regular operation, maintenance, and cleaning of the feed system.
3. All PVC fittings shall be solvent-welded or threaded. No PEX fittings shall be located underground.
4. Contractor shall install chemical feed discharge lines so that the product is injecting directly into the waste streams and not onto structures or equipment.

2.6 CONTROLS AND INSTRUMENTATION

Programming and dosing schedule for the odor control chemical feed pump shall be provided by the Owner.

Control Panel:

1. Provide a NEMA 4X, 316 stainless steel, mounting stand (Dimensions 20” tall x 16” wide x 10” deep) with back plate including, but not limited to, the following:
   a. A 36” tall, minimum 8” x 8” stainless steel pedestal
   b. Electrical termination blocks for two (2) pumps and one (1) submersible level transducer.
   c. A Hand-Off-Auto selector switch (22mm) installed in a single gang poly enclosure mounted to the back plate inside of main enclosure.

Provide submersible level transmitter for monitoring the level in the chemical tank.

1. Output shall be 4-20 mA DC analog output to the PLC under Section 3608 Motor Control Panel. Programming of the level transmitter shall be completed at the PLC. Contractor to coordinate with the OWNER.
2. Transducers in Class I locations shall be FM approved as being suitable for Class I, Division 1, Groups A, B, C, and D locations and shall have an operating range of -40°F to 200°F.
3. The level transmitters shall be Dwyer Instruments SBLT2-5-40, or equal.

2.7 FINISHES

It is the intent of these specifications that equipment, support and accessories be furnished factory shop-primed and finish-painted. Equipment and appurtenances shall be prepared in accordance with commercial grade SSPC specifications No. 6. Priming and finish painting shall be as recommended by manufacturer and shall be suitable for describe if applicable (e.g., corrosive atmosphere, high temperature, outdoor operation). Touchup paint shall be provided by manufacturer.

2.8 ANCHOR BOLTS

Provide all anchor bolts required for equipment furnished. Anchor bolts shall be 316 stainless steel of ample strength for the intended service. Provide anchor bolts in accordance with Section 3300, Sanitary Sewer Pumping Station, General.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit shop drawings and product data in accordance Section B, Standard General Conditions of the Construction Contract.

Submittals for motors associated with the equipment specified in this section shall include data sheets from the motor manufacturer. Data sheets from the equipment manufacturer or supplier are not acceptable.

Submittals shall include, but not be limited to the following:

1. Drawings showing plan and elevation views of the odor control chemical feed and storage system.
2. Control system layout drawing.
3. Controls system electrical and wiring diagram.
4. Manufacturer's catalog information on major system components including, but not limited to:
    a. Chemical Feed Pumps
    b. Odor Control Chemical Feed Controls
    c. Liquid Storage Tank
    d. Statement of design conditions and performance guarantee
    e. Statement of Warranty

3.2 OPERATIONS AND MAINTENANCE MANUALS

Operation and maintenance manuals shall be provided by the Manufacturer prior to installation of all major equipment components. These manuals shall include at a minimum:

1. Information in hazards associated with the system and the appropriate safety precautions.
2. All appropriate Material Safety Data Sheets.
3. Equipment installation instructions.
4. Equipment startup instructions.
5. Equipment maintenance procedures.
6. Troubleshooting guide.
7. Individual operation and maintenance information on major system components, including but not limited to:

a. Chemical Feed Pumps
b. Odor Control Chemical Feed Controls
c. Liquid Storage Tank

8. Spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

PART 4 – EXECUTION

4.1 GENERAL

Refer to requirements specified in the General Conditions of these specifications for equipment installation, quality control, testing, supervision, startup, and operator training. Comply with additional requirements as specified below.

4.2 INSTALLATION

The system shall be installed in accordance with the manufacturer's instructions. All installation personnel shall be trained and qualified in the areas of plumbing, electrical work, and instrumentation as required to complete the installation.

4.3 STARTUP

Startup shall consist of priming of the pumps, a visual inspection of the tank, pump, and fittings for leaking, and pump startup. Contractor shall assist the owner with setting the initial dosing rate for the pumps, as requested. System integration for the chemical feed pumps and level transmitter will be completed by the OWNER as required. Owner shall supply the initial fill up of the chemical feed tank.

PART 5 – TESTING

This Section Not Used.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be included in the lump sum cost of bid for Item 3300 – Sanitary Sewer Pump Station, General and Item 3301- Sanitary Sewer Pump Station, Electrical, otherwise referred to as Item 3300/3301 Sanitary Sewer Pump Station, Complete.

END OF SECTION

SECTION 3310 – PVC SEWER FORCE MAINS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary for furnishing and installing PVC force main pipe and ductile iron fittings as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

1.2 GENERAL

This work shall consist of providing all labor, materials, and equipment necessary for furnishing and installing PVC force main pipe and ductile iron fittings including all bends, reducers, tees, sleeves and special castings required for the installation of the valves, strapping, placement of concrete thrust blocks and all other work required for furnishing and installing force mains complete and ready for service as shown on the Contract Drawings or as otherwise directed by the Owner's Representative.

The force main and fittings shall be installed in accordance with the Contract Drawings, the American Water Works Association (AWWA) for potable water main and fittings installation and the Village of Mt. Orab Utility Department Standard Specifications and Rules and Regulations.

PART 2 – PRODUCTS

2.1 PVC FORCE MAIN

PVC pressure pipe shall be manufactured in accordance with AWWA C-900. The outside diameters shall match ductile iron pipe outside diameters. The wall thickness shall meet the DR 14 requirement in AWWA C-900. Minimum diameter of force mains shall be 6".

2.2 DUCTILE IRON FITTINGS

All fittings, wall pipes and specials shall be of ductile iron or in accordance with ANSI A21.10 (AWWA C-153).

All fittings shall have a bituminous coated cement lining complying with AWWA C-104 and shall have an outside coating complying with AWWA C-153 or an epoxy coating complying with AWWA C-116.

All ductile iron fittings shall be provided with mechanical joint ends.

2.3 CONCRETE THRUST BLOCKING

Concrete thrust blocking, supports and/or buttresses shall be provided at all tees and bends and at any other locations required by the District. These concrete structures shall be built to the lines, grades and dimensions shown on the Standard Drawings. Concrete used for blocking shall conform to Class C Concrete, having a compressive strength of 4,000 pounds per square inch.

All concrete shall be mixed by mechanical means prior to installation. The installation of dry concrete will not be permitted.

2.4 TRACER WIRE & BOX

The tracer wire system shall include THW size 10 AWG copper electrical wires. The boxes shall be equal to Bingham & Taylor 4930, 3" curb box, screw type, with extension(s) as necessary to allow the bottom section of the curb box to rest on the force main and the upper section to be level with the ground surface. Curb box covers shall include the word "SEWER" on the cover.

2.5 PIPE JOINT RESTRAINT

Pipe joint restraints shall be Field Lok Gasket, American Fast Grip, RieberLok or approved equal as determined by Owner's Representative, except as modified herein.

2.6 MAGNETIC TRACING TAPE

Magnetic marking / locater tape shall be installed the entire length of the pipe at a location 12" over the pipe.

2.7 FORCE MAIN LATERALS

Force main laterals are to be per the Village standard detail.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of the materials to be used for review & approval by the Owners Representative prior to ordering.

PART 4 – EXECUTION

4.1 GENERAL

The Contractor shall furnish all necessary labor, material, tools, and equipment required in the installation of the force main pipe and fittings. This work includes furnishing all materials, the proper

storage of those materials, saw cutting, excavation, laying and joining the pipe, installation of concrete blocking and joint restrains, backfilling, installation of tracer wire and locator tape, repairing or replacing all drains, sewers, utilities, and any other structures that may be disturbed or damaged by the

Contractor's operations including driveway culvert pipes, and restoration of all disturbed surfaces. Also included in this item is the disposition of all excavated materials. All work shall be completed as shown on the Contract Drawings and as directed by the Owner's Representative.

Pipe and fittings shall be handled so that the joints, coating and/or lining will not be damaged. If, however, any part of the jointing coating or lining is damaged, the repair or replacement of such material shall be made by the Contractor at his own expense in a manner satisfactory to the Owner's Representative.

All pipe and fittings stored on the job site shall be placed on blocks and suitably chocked to eliminate any possibility of rolling or shifting. Blocks and chocks shall have a minimum thickness of 2 inches and shall be high enough to assure that the pipe and fittings will not be touched by surface drainage.

The Contractor is responsible to repair or replace all pavement and roadway surface disturbed by the contractor, as a result of the force main and fittings installation, to the satisfaction of the governing entity of said pavement or roadway surface.

4.2 INSTALLATION

The general proposed location of the force mains and connections to the existing sewer manholes are shown on the Plans. If, during the course of work, unforeseen conditions arise, the location of the pipeline may be changed as directed by the Owner's Representative to meet such conditions. Long radius curves or small angular changes in the pipeline can be formed by deflecting joints of straight pipe not more than 3 degrees to the axis of the pipe.

When cut all rough edges must be filed to provide a smooth, beveled edge.

The Contractor shall furnish, place, and maintain sheeting and bracing as may be required to securely support the sides and ends of the excavation and to prevent injury to the structure being built or to personal property or adjacent utilities.

Proper tools and facilities satisfactory to the Owner's Representative shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, and valves shall be carefully lowered into the trench by means of derricks, ropes, or other suitable tools or equipment, in such a manner to prevent damage to the force main materials and protective coating and lining. Under no circumstances should force main or fitting material be dropped or dumped into the trench. Materials cracked, gouged, chipped, dented or otherwise damaged shall be rejected.

All pipe and fittings shall be brushed to remove all foreign matter and carefully examined for cracks and other defects while suspended above the trench immediately before installation. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed into the trench.

When pipe installation is not in progress, the open ends of the installed pipe shall be closed by a water tight plug or other means approved by the Owner's Representative.

If water is in the trench, the seal shall remain in place until the trench is pumped dry.

Ends of pipe shall be carefully wiped clean and dry before joining.

All PVC force mains shall include and shall be installed in bedding and initial backfill material as described in Item 1200-Granular Bedding and Initial Backfill Material.

Restraints shall be installed where called for on the contract drawings and as directed by the Owner's Representative.

Backfill and pavement replacement shall be installed as described in Item 1130-Concrete Pavement Replacement, Item 1140-Asphalt Pavement Replacement, Item 1210-Controlled Density Fill (CDF), and Item 1220-Granular Backfill.

The proposed PVC force main pipe and fittings shall be installed with a minimum 4 feet cover from finished ground elevation to the top of the force main, unless otherwise noted on the contract drawings or approved by the Owner's Representative.

4.3 TRACER WIRE

A complete tracer wire system shall be furnished and installed on all PVC pipe used underground. The wire shall be continuously wrapped around the entire length of the PVC pipe, shall be THW size 10 AWG copper electrical wire, and shall terminate and be looped through all manholes as installed as part of the forcemain. Sufficient wire shall be looped in the location boxes that the wire can extend to above the boxes. Location boxes shall provide access to tracer wire at 500 foot intervals. In addition, locator tape properly installed 12" above the pipe is required with proper backfill.

PART 5 – TESTING

5.1 GENERAL

The contractor is responsible for all costs associated with hydraulic pressure testing (including water). Should the pipe line fail this test, the contractor shall be responsible to locate and repair the damaged section of pipe.

All testing of the force main shall be as specified in the AWWA specifications and shall be witnessed, inspected and approved in writing by the Village of Mt. Orab Utility Department.

5.2 HYDROSTATIC TESTING

As a minimum, all sewer force mains shall be tested in accordance with the Hydrostatic Testing Requirements of AWWA C600.

A. All force mains shall be given a hydrostatic test of at least 1.5 times the shutoff head of the connected pumps or 150 psi, whichever is greater. Loss of water pressure during test shall not exceed 5 psi in a 2-hour period.

B. Where practicable, pipelines shall be tested between line valves or plugs in lengths of not more than 1500 feet.

C. The pipe shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the District. The pump, pipe connection, gauges, and all necessary apparatus shall be furnished by the Contractor. Before applying the specified test pressure, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks at such points so the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied.

D. Duration of test shall not be less than two hours.

E. The test pressure shall not exceed the rated pressure of the valves in the pipeline.

F. The Contractor will provide water for testing the force mains and the Contractor will be responsible for piping or hauling the water if necessary.

G. No pipe installation will be accepted if the leakage is greater than that determined by the formula:

$$L = \frac{SD\,(P)^{1/2}}{133{,}200}$$

in which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested, in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge. Allowable leakage at various pressures and pipe sizes are shown in the Table below (from AWWA C600 - Table 6A):

Avg. Test Pressure Ps	**3”**	**4”**	**6”**	**8”**	**10”**	**12”**	**14”**	**16”**	**18”**	**20”**	**24”**	**30”**	**36”**	**42”**	**48”**	**54”**
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97

125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

Allowable Leakage Per 1,000 Feet of Pipeline* - gph

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Linear Feet (LF) price bid for Item 3310 – PVC SEWER FORCE MAIN. Progress payments will be made based on the measured quantities of Item 3310 completed. The Contractor shall review the submitted units completed and provide confirmation to the Owner's Representative of the measurements prior to payment for work under this specification.

END OF SECTION

SECTION 3320 – FORCE MAIN ACCESS MANHOLE

PART 1 – GENERAL

1.1 GENERAL

Provide all Labor, Material, and Equipment necessary for furnishing and installing new force main access manhole as located and detailed on the contract drawings, in accordance with these Specifications and Village of Mt. Orab Standard Details, and as directed by the Owner's Representative.

1.2 RELATED WORK

A. Section 3200 – Gravity Sewer Manholes

PART 2 – PRODUCTS

2.1 MANHOLE

Force main access manholes shall meet all requirements of Section – 3200 Gravity Sewer Manholes except as modified herein.

2.2 COUPLING

Couplings shall be Dresser Style 138 or equal as determined by the Owner's Representative.

PART 3 – SUBMITTALS

Contractor shall submit literature and/or catalog cut sheets of the access manhole and coupling to Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Force main access manholes shall be installed every 600 feet.

Force main access manholes shall contain a removable section of pipe secured in place with an expansion type pipe coupling at each end.

Force main access manholes shall include a 2 foot x 2 foot x 2 inch sump pit constructed of 2000 psi concrete. The bottom of the manhole shall be sloped towards the sump pit and shall have a maximum thickness of 4 inches.

PART 5 – TESTING

Force main access manholes shall be tested in accordance with Section – 3200 Gravity Sewer Manholes

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
3320	Each (Ea.)	Force Main Access Manhole

END OF SECTION

SECTION 3330 – FORCE MAIN LOW POINT MANHOLE

PART 1 – GENERAL

1.1 GENERAL

Provide all Labor, Material, and Equipment necessary for furnishing and installing new force main low point manhole (also known as a Drain Manhole) as located and detailed on the contract drawings, in accordance with these Specifications and Village of Mt. Orab Standard Details, and as directed by the Owner's Representative.

1.2 RELATED WORK

A. Section 3200 – Gravity Sewer Manholes
B. Section 3110 – PVC Sewer Force Mains

PART 2 – PRODUCTS

2.1 MANHOLE

Force main low point manholes shall meet all requirements of Section – 3200 Gravity Sewer Manholes except as modified herein.

2.2 FLANGE ADAPTER

Flange Adapter shall be Dresser Style 128 or equal as determined by the Owner's Representative.

2.3 FITTINGS

Force main low point manhole fittings shall be flanged ductile iron pipe meeting all requirements of Section 3310 - PVC Sewer Force Mains except as modified herein.

2.4 PLUG VALVE

Plug valves shall be of the non-lubricating, eccentric type with resilient faced plugs and ANSI 125 lb. flanged ends. Bodies shall be semi-steel or cast iron with raised seats and shall be of the bolted bonnet design, suitable for 150 psig pressure. Bearings shall be noncorrosive and permanently lubricated. Valve seats shall be nickel, or nickel-coated stainless steel or bronze. Valve packing shall be Nitrile- Butadiene (Buna (VEE)). The valves shall provide drip-tight shut-off in either direction up to 150 psig. The resilient face material of valves for sewage and sludge service shall be Neoprene or Hycar. All straightway valves shall be DeZurik Series 100, Clow F-5412, Homestead Ballcentric or District approved equal.

Each plug valve shall be furnished with a handwheel and gear actuator. Gear actuators shall be of the totally enclosed wormgear type, oil or grease lubricated and sealed for watertightness, with self- lubricating bronze or stainless steel sleeve bearings, thrust bearings, built-in adjustable opening and closing stops and valve position indicators. Each actuator shall be sized to require not more than 300 inch pounds of torque in the input shaft to seat and unseat the valve plugs at the pressure drops specified herein.

2.5 CONNECTION

Force main low point manhole connection shall be 4 inches in size and include a 4 inch blind flange, tapped for 4 inch diameter male NPT adapter with cap equal to OPW figures 633-F and 634-B.

PART 3 – SUBMITTALS

Contractor shall submit literature and/or catalog cut sheets of the force main low point manhole, adapter, fittings, and plug valve to Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Low point manholes shall include a 2 foot x 2 foot x 2 inch sump pit constructed of 2000 psi concrete. The bottom of the manhole shall be sloped towards the sump pit and shall have a maximum thickness of 4 inches.
Where possible, all plug valves shall be installed with shafts horizontal and plugs opening to the top of the valve. Seat ends of plug valves shall be located such that when closed, the line pressure will hold the plug against the seat, unless specifically noted otherwise on the Drawings.

PART 5 – TESTING

Force main access manholes shall be tested in accordance with Section – 3200 Gravity Sewer Manholes.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
3330	Each (Ea.)	Force Main Low Point Manhole

END OF SECTION

SECTION 3340 – FORCE MAIN AIR RELEASE VALVE AND MANHOLE

PART 1 – GENERAL

1.1 GENERAL

Provide all Labor, Material, and Equipment necessary for furnishing and installing new force main air release valve and manhole (also known as high point manhole) as located and detailed on the contract drawings, in accordance with these Specifications and Village of Mt. Orab Standard Details, and as directed by the Owner's Representative.

1.2 RELATED WORK

A. Section 3200 – Gravity Sewer Manholes

PART 2 – PRODUCTS

2.1 MANHOLE

Force main air release valve and manholes shall meet all requirements of Section – 3200 Gravity Sewer Manholes except as modified herein.

The manhole base shall be constructed using a precast concrete footing ring with an open center.

2.2 AIR RELEASE VALVE

Air release valve shall be combination type sewage air valves, sufficiently long enough to maintain an air gap between the sewage media and the air release orifice. Each air release valve shall be fitted with one (1) gate valve (shut off); one (1) gate valve (blow off), one (1) 1/2 inch gate valve (back flush), with a quick disconnect coupling, a minimum of 10 feet of hose to permit back flushing after installation without dismantling the valve, and all associated pipe fittings. All body and interior parts shall be stainless steel.

Sewage combination air valves shall be A.R.I. D-020 or D-025 or approved equal as determined by the Owner's Representative.

2.3 FITTINGS

Force main air release manhole fittings shall be flanged ductile iron pipe meeting all requirements of Section – 3120 Ductile Iron Gravity Sewer Main except as modified herein.

PART 3 – SUBMITTALS

Contractor shall submit literature and/or catalog cut sheets of the air release manhole and coupling to Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Sewage air valves shall be installed using a tee and reducing flange (reduces to 2") where necessary. Saddles will not be permitted.

The center of the footing ring shall be filled with a minimum of 6" of aggregate base #57 stone.

PART 5 – TESTING

Air Release valve shall be tested in accordance with the manufacturer's recommendations.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
3340	Each (Ea.)	Force Main Air Release Valve and Manhole

END OF SECTION

SECTION 3350 – FORCE MAIN DISCHARGE MANHOLE

PART 1 – GENERAL

1.1 GENERAL

A. Provide all Labor, Material, and Equipment necessary for furnishing and installing new force main discharge manhole and connections to said manhole, as located and detailed on the contract drawings, in accordance with these Specifications and Village of Mt. Orab Standard Details, and as directed by the Owner's Representative.

B. Provide all Labor, Material, and Equipment necessary to modify and convert existing sanitary manhole to force main discharge manhole, as located and detailed on the contract drawings, in accordance with these Specifications and Village of Mt. Orab Standard Details, and as directed by the Owner's Representative.

1.2 RELATED WORK

A. Section 3200 – Gravity Sewer Manholes

PART 2 – PRODUCTS

2.1 MANHOLE

Force main discharge manholes shall meet all requirements of Section – 3200 Gravity Sewer Manholes except as modified herein.

2.2 MANHOLE LINING MATERIAL

Manhole lining material shall be Sauereisen SewerGard epoxy polymer or approved equal. Material shall be an impermeable, high strength, corrosion-resistant, fiber-filled or aggregate-filled epoxy material specifically designed to protect concrete surfaces of municipal wastewater treatment structures and collection systems from chemical attack and physical abuse. The material shall prohibit water infiltration and shall have proven resistance to a broad range of corrosive chemicals, including sulfuric acid created by hydrogen sulfide gas as well as other chemicals typically found in sanitary sewers. The material shall be suitable for application over damp or dry concrete surfaces without the use of a primer. The material shall have a non-sagging consistency to permit application on vertical and overhead surfaces.

PART 3 – SUBMITTALS

Contractor shall submit literature and/or catalog cut sheets of the force main discharge manhole and

lining material to Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

Where the discharge manhole is located at the end of a gravity sewer main, the crown of the force main shall be install at the same elevation as the crown of the gravity sewer main.

Where the discharge manhole is not located at the end of a gravity sewer line, the invert of the force main shall be installed not more than one foot above the sewer main flow line, no more than a 45 degree angle as measured from the flow line of the sewer main, and in the same general direction as the flow of the sewer main.

The manhole channel and bench shall be construction or modified to provide a smooth flow of sewage from the force main sewer to the gravity sewer and between the sewer influent and effluent.

All lining material shall be installed by manufacturer trained and certified installer. Copies of installer certificates shall be provide to Owner's Representative.

The force main discharge manhole shall be prepared, repaired, and lined per manufacturer's recommendations. The coatings shall be applied to the vertical and overhead surfaces of the concrete and masonry structures. The material may be trowel or spray applied as recommended by the manufacturer. The final material thickness shall be a minimum of 20 mils. Contractor shall provide a 5 year warranty on all lining material and labor.

The interior of the manhole frames and covers shall be coated with polymer or epoxy paint or another corrosion resistant product approved by the Owner's Representative. The frames and covers shall be prepared and lined/painted per manufacturer's recommendations.

PART 5 – TESTING

Force main discharge manholes shall be tested in accordance with Section – 3200 Gravity Sewer Manholes.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
3350	Each (Ea.)	Force Main Discharge Manhole

END OF SECTION

SECTION 3510 – CONNECTION TO EXISTING MANHOLE

PART 1 – GENERAL

1.1 GENERAL

Provide all Labor, Material, and Equipment necessary for the connection to existing manhole as called for on the contract drawings, in accordance with these Specifications and Village of Mt. Orab Standard Details, and as directed by the Owner's Representative.

1.2 RELATED WORK

A. Section 3200 – Gravity Sewer Manholes

PART 2 – PRODUCTS

2.1 CONNECTION MATERIAL

Connection materials shall meet all requirements of Section – 3200 Gravity Sewer Manholes except as modified herein.

2.2 MANHOLE TO PIPE CONNECTORS

Connection materials to existing precast concrete manholes shall be mechanically retained "O" rings, Kor-N-Seal I, 106 Series, stainless steel for 6" to 18" sewer mains or Lok-N-Seal II, 206 Series, stainless steel for 18" and greater, as manufactured by NPC/Trelleborg or approved equal.

2.3 GROUT

Grout shall be non-shrink, non-metallic, non-staining, capable of developing a minimum compressive strength of 9,000 psi at 28 days when tested in accordance with ASTM-C-109. Grout shall be free of any metal, plastic, gypsum, and chemicals, and guaranteed not to shrink below its original placement volume at any time. Approved material is Five Star Grout by U.S. Grout Corporation, F-100 by Sauereisen Cement Company, and Masterflow 928 by Master Builders.

PART 3 – SUBMITTALS

Contractor shall submit literature and/or catalog cut sheets of the connection material to Owner's Representative for review and approval prior to ordering.

PART 4 – EXECUTION

For new sewer connections to existing manholes, the pipe openings shall be core drilled to accommodate the new pipe. The connection material shall be furnished and installed per manufacturer's recommendations. The sewer pipe shall be connected in such a manner to provide a water tight leak free connection. The opening around the connection material shall be grouted to the level of the existing bench. The existing manhole channel(s), flow line(s), apron(s), etc. shall be chipped out and re-grouted to accommodate the new piping. The new grout shall be installed and troweled in place to provide a smooth continuous even sloped surface from the influent sewer pipe through the manhole to the effluent sewer pipe.

All connections where the pipe is 2 feet or more feet above the invert of the manhole will require an inside drop. Where the difference is less than 2 feet, the manhole channel and bench shall be contoured and sloped to prevent solid deposits.

All openings and damage to manholes shall be repaired using non-shrink grout material as identified in paragraph 2.3. Temporary backing or forming may be required for the installation of the grout material. Grout shall be placed until flush with outside face of the manhole wall and troweled to provide a smooth surface. Grout shall be mixed and installed per manufacturer's recommendations. All voids and spaces shall be filled, excess grout trimmed, and the surface finished to match adjoining surfaces or as directed by Owner's Representative.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be based on the following bid items, units, and unit prices:

Item	Unit	Description
3510	Lump Sum (LS)	Connection to Existing Manhole

END OF SECTION

SECTION 3520 – DOGHOUSE STYLE MANHOLE

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, materials, and equipment necessary to install the doghouse style manholes conforming to the specifications and of the types and sizes shown on the Standard Drawings and shall construct the same in accordance with these Specifications at the locations and to the lines and grades shown on the Drawings.

1.2 LOCATION OF MANHOLES

Manhole locations shall conform to Section 3200.

PART 2 – PRODUCTS

All products shall conform to Section 3200.

PART 3 – SUBMITTALS

3.1 GENERAL

Submit literature and/or catalog cut sheets of the materials to be used for review & approval by the Owners Representative prior to ordering.

PART 4 – EXECUTION

4.1 MANHOLE CONSTRUCTION

Manholes shall be watertight structures constructed with monolithic 4000 PSI concrete cast-in-place bases extending to undisturbed earth and/or a minimum of 18” below the invert of the existing sewer on which the doghouse manhole is being constructed, in combination with precast riser sections (field set over the existing sewer), cones and/or flat slab tops. The top of the existing sewer main will be neatly cut out and removed inside the manhole. Contractor to take appropriate measures to prevent foreign material from entering the sewer system.

Field pour the bottom channel; fill with 2000 PSI concrete. Shaping of manhole walls and bottoms is required to provide for pipe junctions, channels, etc.; such work shall be made with Class “F” concrete conforming to the requirements of ODTO Item 499 and 511.

The invert channel and manhole bench shall be constructed as shown in the Standard Drawings. In general, the invert channel shall be a smooth continuation of the pipe and U-shaped. The bench shall provide good footing for workmen and have a 1 inch batter towards the invert channel.

Minimum wall thickness of circular precast manhole bases, risers and cones shall be as scheduled below:

Inside Diameter (feet)	Minimum Wall Thickness (inches)
4	5
5	6
6	7
6.5	7.5
8	9

Openings for the inlet and outlet sewer pipes shall be cast in the precast units.

All pipe entering manholes at precast openings and along all barrel sections shall be sealed by means of imbedded flexible rubber gaskets.

Flexible grout to be utilized on the inside of all manholes at all joints, steps, and pipe as directed by the Utility Department.

Manholes planned within any pavement will have the rim match the profile and section of the existing roadway.

PART 5 – TESTING

The doghouse style manholes will be tested and inspected in accordance with Section 3200.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the Each (EA) price bid for Item 3520 – X' DIAMETER DOGHOUSE STYLE MANHOLES.

Item	Unit	Description
3520	Each (EA)	X' DIAMETER DOGHOUSE STYLE MANHOLES

Progress payments will be made based on the manholes actually installed, as measured by the OWNER'S REPRESENTATIVE. The Contractor shall review the submitted units completed and provide confirmation to the Owner's Representative of the measurements prior to payment for work under this specification.

END OF SECTION

SECTION 4000 – INTERCEPTORS AND SEPARATORS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Interceptors shall be provided, operated and maintained whenever liquid or liquid wastes are received by the plumbing system which may contain flammable, explosive, noxious toxic, gaseous, corrosive or other materials that may be hazardous to the building or its occupants, or that may be harmful to the building drainage system, the wastewater system, sewage treatment plant or its processes. Deleterious and detrimental materials include but are not limited to greases, oils, sugars, paraffin or other waxes, plastic wastes, paints and other coatings, sands, silts, clays and similar earthly materials will be intercepted and prevented from entering the wastewater system.

Businesses operating within a permanent structure(s) which are licensed as Retail Food Establishment (RFE), Food Service Operation (FSO) or Temporary Food Service Operation (FSO) operating seven (7) consecutive days or greater than fifty-two (52) days a year shall discharge through an interceptor before entering the public sewer system.

Wastes from industrial processes, meat packing and food processing industries, and similar processing plants shall be handled in accordance with plans and specifications, approved by the Ohio Environmental Protection Agency and the Village of Mt. Orab Utility Department. The plans and specifications submitted for approval shall include a full description of the wastes, their characteristics and volume. The system shall be approved by the proper authority before any work or construction begins.

Some users including but not limited to (auto maintenance, carwash, industrial, etc.) may be required to install a grease/grit trap as determined by the Village of Mt. Orab. These are to be reviewed on a case-by-case basis. Contact Village Utility Department prior to design and submission for coordination prior to approval and construction.

1.2 INTERCEPTOR DESIGN

Interceptors shall be designed and sized in accordance with OAC 4101:3-10-01 (Traps, Interceptors and Separators). Flow rate (gpm) for grease interceptors shall be determined using the total volume of all the fixtures draining in one (1) minute plus the total of other fixtures that have a designed flow rate. If actual fixtures are not known or are likely to change in the future, assume the maximum flow is full pipe at ¼" slope (i.e., 2" = 20 gpm, 3" = 60 gpm, 4" = 125 gpm, 5" = 230 gpm, 6" = 375 gpm).

Outside (external) grease interceptors shall meet requirements of OAC 3745-42-02. Minimum outside grease interceptor size shall be 1,000 gallons.

In accordance with Section 4.2.D of the Village of Mt. Orab Utility Department Rules and Regulations,

garbage grinders shall not be connected to the POTW from hotels, institutions, restaurants, hospitals, groceries, catering establishments or similar places where garbage originates from the commercial or large-scale preparation of food for the purpose of sale, consumption on the premises, or for service by caterers.

Interceptors shall be constructed such that the top of the outlet pipe is at least twenty-four inches below the invert of the inlet pipe. The outlet shall rise adjacent to an external to the interceptor to the outlet drain where a double tee or cross fitting with the run vertical shall connect to the outlet riser and the outlet drain line. The top of the cross and the back side of the cross shall extend upward to grade level where a cleanout plug of same size shall be installed. The outlet must be at least 12” above the tank bottom to allow solids settling. See standard Detail S7.1 for illustration.

PART 2 – PRODUCTS

Hydromechanical Grease Interceptors shall be model Watts GI-K, Zurn Z1172, or approved equal. Grease interceptors with removable diffusers will not be accepted.

END OF SECTION

SECTION 4100 – ABANDON EXISTING WATER LINES & FIRE HYDRANTS

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all labor, material and equipment necessary to abandon existing water main and appurtenances and existing fire hydrants as shown on the project drawings and as described in this specification.

1.2 RELATED WORK

A. Section 2110 - DUCTILE IRON WATER MAIN AND DUCTILE IRON FITTINGS

B. Section 2400 - WATER SERVICE, FITTINGS, AND METER SETTING (SINGLE, DOMESTIC SERVICE 2" AND SMALLER)

PART 2 – PRODUCTS (Not Applicable)

PART 3 – SUBMITTALS

The Contractor shall submit a water main shutdown request to the Owner in order to complete the abandonment. The request must be submitted at least one (1) week in advance of the desired shutdown date.

PART 4 – EXECUTION

Installation of new fire hydrants and replacement of all water services shown to be relocated shall be fully complete prior to beginning the abandonment process.

All hydrants designated for abandonment shall be removed immediately after they are shutdown or bagged until they are removed. The Contractor shall remove the complete hydrant, including the entire riser and bottom elbow, and deliver to the Owner. Hydrant watch valves shall be closed and valve cans removed.

Remove all valve cans for valves designated for abandonment and backfill to existing grade with acceptable native soil. For valve cans within existing pavement, the Contractor shall chip/break the valve can 3" below grade then fill the valve can with ODOT Item 304 stone and cap with 2" of ODOT Item 448 asphalt concrete to match surrounding pavement elevation.

Segments removed from existing water main shall properly disposed of offsite. Cap remaining water main on both the active and the abandon sides with mechanical joint caps and install concrete thrust blocks in accordance with the County's standard concrete blocking requirements.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work as described above and as detailed on the project plans shall be at the:

Item	Unit	Description
Special	Lump Sum (LS)	Abandon Existing Waterlines & Appurtenances
Special	Each (EA)	Fire Hydrant Assembly Removed

END SECTION

SECTION 4200 – CONNECT TO EXISTING WATER MAIN

PART 1 – GENERAL

1.1 SCOPE OF WORK

Provide all Labor, Material, and Equipment necessary to connect the proposed water main to the existing water main, not included in other bid items, as shown on the Contract Drawings or as directed by the Owner's Representative.

This work shall include all additional saw cutting, excavation, removal of existing blocking, removal of existing end cap/plug, cleaning of inside of existing tee, blocking, initial backfill materials, backfill materials, paving, disposal of all debris, and any other items necessary to complete the connection.

1.2 RELATED WORK

A. Section 2110 Ductile Iron Water Main and Ductile Iron Fittings

PART 2 – PRODUCTS

All materials used to complete this installation shall be as described in Section 2110 - Ductile Iron Water Main and Ductile Iron Fittings.

PART 3 – SUBMITTALS (Not Applicable)

PART 4 – EXECUTION

4.1 GENERAL

All work shall be completed as shown on the Contract Drawings and as directed by the Owner's Representative.

Contractor is responsible for coordinating shut down of existing water main with water operations personnel and as outlined in the Village of Mt. Orab Utility Department Standard Operating Procedures, and for providing written notification to all affected property owners a minimum of 48 hours prior to the start of any shut downs.

Pipe and fittings shall be handled so that the joints, coating and/or lining will not be damaged. If, however, any part of the jointing coating or lining is damaged, the repair or replacement of such material shall be made by the Contractor at his own expense in a manner satisfactory to the Owner's Representative.

4.2 INSTALLATION

Contractor shall verify size and type of existing water main prior to ordering materials for making connection.

Contractor shall be responsible for verifying location and depth of existing water main prior to the start of construction.

Contractor shall complete work in a manner that limits their impact on the traveling public.

Contractor shall provide all disinfection necessary, as required by AWWA for disinfection of potable water mains and as directed by the Owner's Representative, to return the existing water main back in to service as soon as possible.

The connection to the existing water main shall be completed and shall be free of leaks prior to work continuing on the remaining water main.

PART 5 – TESTING (Not Applicable)

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid per each (ea.) for Item SPECIAL – CONNECT TO EXISTING WATER MAIN. Progress payments will be made based on the number of Item Special – Connect to Existing Water Main completed.

END OF SECTION

SECTION 4300 – HORIZONTAL DIRECTIONAL DRILLING (HDD)

PART 1 – GENERAL

1.1 SCOPE OF WORK

Furnish all labor, materials, tools and equipment as necessary to construct a pipeline crossing by the horizontal directional drilling method. Furnish all labor, equipment, materials and supplies and perform all work necessary to provide Village of Mt. Orab Utility Department with a complete, finished water main crossing. The finished work includes proper installation testing, restoration of underground utilities and environmental protection and restoration.

1.2 QUALITY ASSURANCE

A. HDD equipment operators shall be trained to operate the specific Horizontal Directional Drilling equipment for the Village of Mt. Orab project with at least 3 years of experience in directional drilling obtained within the last five years. All pipe and appurtenances of similar type and material shall be furnished by a single manufacturer.

B. Perform HDD operations under the constant direction of a drilling supervisor who shall remain on site and be in responsible charge throughout the drilling operation. The Contractor's supervisor shall have supervised directional drilling of a minimum of 5,000 linear feet of pipe of a similar or greater diameter, of similar material, over similar lengths, and with similar subsurface conditions.

C. The requirements set forth in this Specification specify a wide range of procedural precautions necessary to ensure that the basic, essential aspects of a proper Directional Bore installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this Specification.

D. Perform the work in general conformance with ASTM F1962, current revision, "Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings."

E. Adhere to the Specifications; any changes must be expressly approved by the Village of Mt. Orab Utility Department or Village Engineer. Approval of any aspect of any Directional Bore operation covered by this Specification shall in no way relieve the Contractor of its ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

1.3 RELATED WORK

SECTION 2120 - PVC WATER MAIN AND DUCTILE IRON FITTINGS

PART 2 – PRODUCTS

2.1 PIPE

A. Pipe suppliers shall furnish fusible polyvinyl chloride pipe conforming to all standards and procedures, and meet all testing and material properties as described in this specification.

B. Pipe shall conform to the following dimensionality and general characteristics.

Pipe Description	Nominal Diameter (in.)	DR	Color	Pressure Class (psi)
Fusible PVC ® Water Main	4-12	18	Blue	235

PART 3 – SUBMITTALS

3.1 CONTRACTOR INFORMATION

A. Submit for information only.

1. Presentation of similar experience in the last 3 years.

2. Including, but not limited to, owner's name, address, telephone number, contact person, date and duration of work, location, pipe information, and contents handled by pipeline.

3. Supervisory field personnel and historical information of HDD experience.

4. At least one field supervisor listed must be at site when HDD operations are in progress.

3.2 WORKING DRAWINGS

B. Working Drawings and written procedure describing in detail proposed method and entire operation for information only including, but not limited to:

1. Size, capacity and arrangement of equipment.

2. Location and size of drilling and receiving pits.

3. Dewatering and methods of removing spoils material.

4. Method of installing detection wire and pipe.

5. Type, location and method of installing locator station.

6. Method of fusion pipe segment and type of equipment.

7. Type of cutting head.

8. Method of monitoring and controlling line and grade

9. Detection of surface movement.

10. Bentonite drilling mud for information only:
    a. Products information, material specifications, and handling procedures.

    b. Material safety data sheet and special precautions required.

    c. Method of mixing and application.

PART 4 – EXECUTION

4.1 INSTALLATION

A. General

1. Determine drilling length and equipment pull strength for type of soil encountered.

2. Provide method to control line and grade.

    a. Provide and maintain instrumentation that accurately locates pilot holes.

    b. Drill pilot hole along path following Drawings to these tolerances:

        1) Vertical alignment plus or minus 0.5 foot. Vertical path of the pilot hole must not establish new high points not shown on Drawings.

        2) Horizontal alignment plus or minus 1.0 foot.

    c. Include electronic monitoring of horizontal and vertical drilling head location. Obtain accuracy within 1 inch of actual position of pipeline. Record position readings at maximum of 10-foot intervals.

    d. At completion of pilot hole drilling, furnish Village of Mt. Orab Utility Department or Engineer with tabulations of horizontal and vertical alignment.

3. When water is encountered.

    a. Provide and maintain dewatering system of sufficient capacity to remove water.

b. Keep excavation free of water until backfill operation is in progress.

c. Perform dewatering in such a manner that removal of soils particles are held to a minimum.

d. Dewater into sediment traps.

4. Maintain close observation to detect settlement or displacement of surface and adjacent facilities.

a. Notify Village of Mt. Orab Utility Department, Engineer, and other applicable agencies immediately if settlement or displacement is detected.

b. Maintain safe conditions and prevent damage.

4.2 OPERATION

B. Drilling Operation

1. Drilling Fluids

a. Maintain drilling fluid in bore hole to increase stability of surrounding soil and reduce drag on pulled pipe.

b. Dispose of drilling fluid and other spoils at location following laws, ordinances, rules, and regulations of local jurisdiction.

c. Transport excess fluids and other spoils to disposal site.

d. Minimize drilling fluid at locations other than entry and exit points. Immediately clean up any drilling fluids that inadvertently surface.

e. Provide clean water for drilling.

2. Pilot Hole Drilling

a. Angle entry hole so that curvature of pilot hole does not exceed allowable bending radius of HDPE pipe.

b. Be able to make a turn of up to 90 degrees and maintain a curvature not to exceed allowable bending radius of HDPE pipe.

c. Alignment Adjustment and Restarts.

1) Follow pipeline alignment on Drawings within tolerances specified herein. Before adjustments, notify Village of Mt. Orab Utility Department or Engineer for approval.

2) Notify Village of Mt. Orab Utility Department or Engineer when forward motion of operation is stopped by an obstruction.

   a) Abandon in place with drilling fluid, unless Village of Mt. Orab Utility Department or Engineer directs otherwise.

   b) Attempt a second installation at approved location or excavate at the point of difficulty and install the HDPE pipe by trench method.

3) Exercise caution including, but not limited to, locating utilities, drilling downholes (test pits) to observe drill stems or reamer assembly to clear other existing utilities at locations following Drawings.

4) Keep the number of boring pits to a minimum.

PART 5 – TESTING

5.1 GENERAL

The Village of Mt. Orab Utility Department is responsible for the first two (2) hydraulic pressure and Bacteriological testing. Should the pipeline fail either of these tests twice, the contractor is shall be responsible to locate and repair the damages section of pipe and to pay the County's costs for each additional test thereafter.

All testing and disinfection of the water main shall be as specified in the AWWA specifications and shall be inspected and approved in writing by the Village of Mt. Orab Utility Department. All water lines must pass a hydraulic pressure testing of 200 psi or as directed by the Owner's Representative.

5.2 DISINFECTION

The contractor is responsible for providing all Labor, Material, and Equipment necessary to disinfect the complete water pipeline in accordance with AWWA 651 and as directed by the Owner's Representative except as modified herein.

All piping and appurtenances must be properly disinfected with a minimum 50 milligrams per liter total chlorine residual for 48 hours. The piping must then be flushed to remove any excess chlorine. Chlorine solution shall be evenly applied and distributed throughout the piping.

5.3 HYDROSTATIC TESTING

A hydrostatic test as required in Section 10 of the Standard AWWA Specifications C-605 shall be applied to individual valved-off sections of the mains and fire hydrant leads either before or after the trench is backfilled. The pressure during the test shall be maintained at 200 psi, or as directed by the Owner's Representative, in any section being tested. The duration of each pressure test shall be at least two hours. The pump, pipe connection, and all necessary apparatus, except the gauges, shall be furnished by the Contractor. The Owner's Representative will furnish the gauges for the test, but the Contractor shall furnish all necessary assistance for conducting the test.

The Owner's Representative will provide water for testing the water main; however, the Contractor will be responsible for piping or hauling the water, if necessary. Before applying the test pressure, all air shall be expelled from the pipe. The Contractor shall not operate any valves in order to fill the new
water main. This shall be done ONLY by the Owner's Representative. The Owner's Representative shall witness all pressure testing.

The following table lists the maximum allowable leakage limits. ALLOWABLE LEAKAGE PER 1000 FT.

OF PIPE (GALLONS PER HOUR)

Test Pressure	Nominal Pipe Diameter (inches)								
psi	2	3	4	6	8	10	12	14	16
200	0.19	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53

Test Pressure	Nominal Pipe Diameter (inches)								
psi	18	20	24	30	36	42	48	54	60
200	1.72	1.91	2.29	2.87	3.44	4.01	4.59	5.16	5.73

Before applying the specified pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made by the Contractor at points of highest elevation, or as required.

In the event that leakage exceeds that shown in the above table, the water main will not be accepted by the District and will require retesting using these same procedures after such time as the necessary corrections have been made to the system.

Leakage shall be defined as the quantity of water that must be supplied to any valved section of newly laid pipe to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Any testing performed against existing valves shall be at the Contractor's risk and in strict compliance with the requirements of the District. Any damage caused to existing facilities as a result of testing shall be repaired at the Contractor's expense.

The Village of Mt. Orab Utility Department is responsible for the first hydraulic pressure and Bacteriological testing. Should the pipeline fail either of these tests, the contractor is responsible to locate and repair the damaged section of pipe and to pay the County's costs for each additional test thereafter.

PART 6 – BASIS OF PAYMENT

Payment for all labor, materials, and equipment necessary to complete the work described above shall be at the unit price bid per Linear Feet (LF) for Item 4300 – HORIZONTAL DIRECTIONAL DRILL (HDD). Progress payments will be made based on the installed linear feet of Item 4300 completed.

END OF SECTION

APPENDIX B

STANDARD DRAWINGS

VILLAGE OF MT. ORAB UTILITY DEPARTMENT

(WATER AND SANITARY SEWER)

VILLAGE OF MT. ORAB, OHIO

STANDARD DRAWINGS

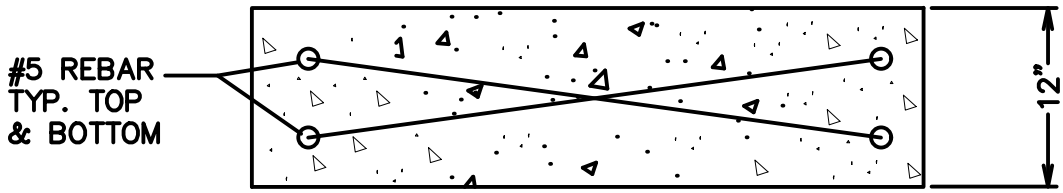
Drawing No.	Title
General Details	
G1.1	Keyblock Anchors for Water or Sewer Mains on Steep Slopes
G1.2	Stream Crossing Concrete Encasement Detail
G1.3	Concrete Blocking for Pipe Fittings on Water & Force Mains
Water Distribution System	
W1.0	General Water Notes
W1.1	Gate and Butterfly Valves
W1.2	Valve Restraint Blocking
W2.1	Fire Hydrant Layout & Assembly
W3.1	Detector Check Valve Assembly
W3.2	5/8” x3/4” & 1” Domestic Meters Assembly
W3.2.1	5/8” x3/4” & 1” Meter Box Detail
W3.3	1-1/2” & 2” Domestic Meters Assembly
W3.3.1	1-1/2” & 2” Meter Box Detail
W3.4	Water Service Connection Detail
W4.1	Fire Protection with Detector Check
W4.2	Dual Service Branch Setting-Domestic Meters 2” & Smaller
W4.3	3” & Larger standard Meter Pit Arrangement
W4.4	Dual Service Branch Setting-3” & Larger Meters
W4.5	Standard Water System Chamber
W4.6	Chamber Access Ladder
W5.1	Water Main Trench Section
W5.2	Water Main Lowering Detail
W6.1	Isolation/Access Valve and Manhole

Drawing No.	Title

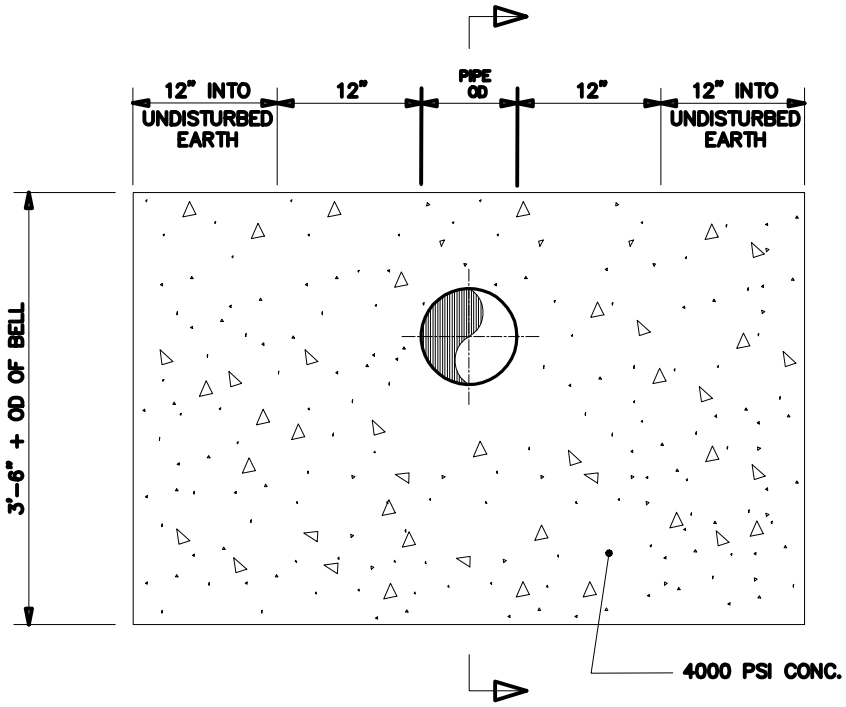
Wastewater Collection System

S1.0	General Sanitary Sewer Notes
S1.1	Standard Manhole for Sewers 8” to 18”
S1.2	Standard Manhole for Sewers 21” to 36”
S1.3	Standard Manhole for Sewers 42” & Larger
S1.4	Inside Drop Manhole
S1.6	Manhole Frame with Vented Lid
S1.7	Manhole Frame with Self Sealing Lid
S1.8	Watertight Frame with Bolt Down Lid
S1.9	Manhole Step – Copolymer
S1.10	IWPT Sampling Manhole
S1.11	Manhole Base “Doghouse” Installation
S2.1	Sanitary Sewer Trench Section
S2.3	Creek Crossing Aerial Type
S2.4	Support Pier
S3.1	Sewer Lateral Installation
S3.2	Dual Service Residential Lateral
S4.1	Commercial Sewer Service Installation
S4.2	Residential Sewer Service Installation
S4.3	Standard Connection to Sewers 12” and Larger
S5.1	Lift Station Layout
S5.1.1	Bar Screen Manhole Detail
S5.1.2	Lift Station Detail
S5.1.3	Valve Chamber Detail
S5.1.4	Wet Well Electric Detail
S5.1.5	Duplex Lift Station Control Panel General Layout
S5.1.6	Duplex Lift Station I/O List
S5.1.7	Lift Station Conduit Routing
S5.1.8	Duplex Control Panel Sample Drawings (1 of 7)
S8.1.9	Duplex Control Panel Sample Drawings (2 of 7)
S5.1.10	Duplex Control Panel Sample Drawings (3 of 7)
S5.1.11	Duplex Control Panel Sample Drawings (4 of 7)
S5.1.12	Duplex Control Panel Sample Drawings (5 of 7)
S5.1.13	Duplex Control Panel Sample Drawings (6 of 7)
S5.1.14	Duplex Control Panel Sample Drawings (7 of 7)

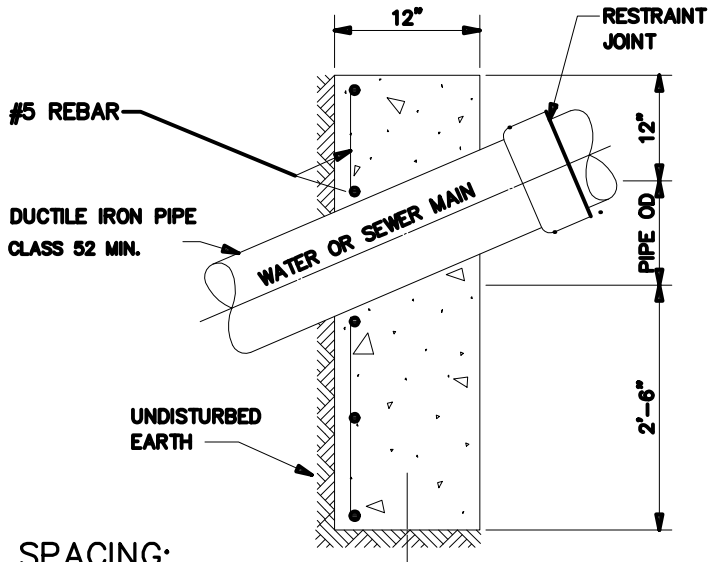
Drawing No.	Title
S5.2.1	Standard Force Main Access Manhole
S5.2.2	Standard Force Main Low Point Manhole
S5.2.3	Air Release Valve in Manhole
S6.1	Standard Septic Tank Effluent Pump (STEP)
S6.1.1	Standard Septic Tank Effluent Gravity (STEG)
S6.2	Typical Residential STEP Connection to a LPFM
S6.2.1	Low Pressure Force Main (LPFM) Lateral Installation
S6.3	Typical Residential STEP Connection to Small Diameter Gravity Sewer
S6.3.1	Small Diameter Gravity Sewer Lateral Installation
S6.4	Low Pressure Force Main Flushing Connection Manhole
S6.5	Low Pressure Force Main Flushing MH w/ Air Release Valve
S6.6	Low Pressure Force Main Terminal Manhole
S7.1	Gravity Grease Interceptor



TOP



ELEVATION



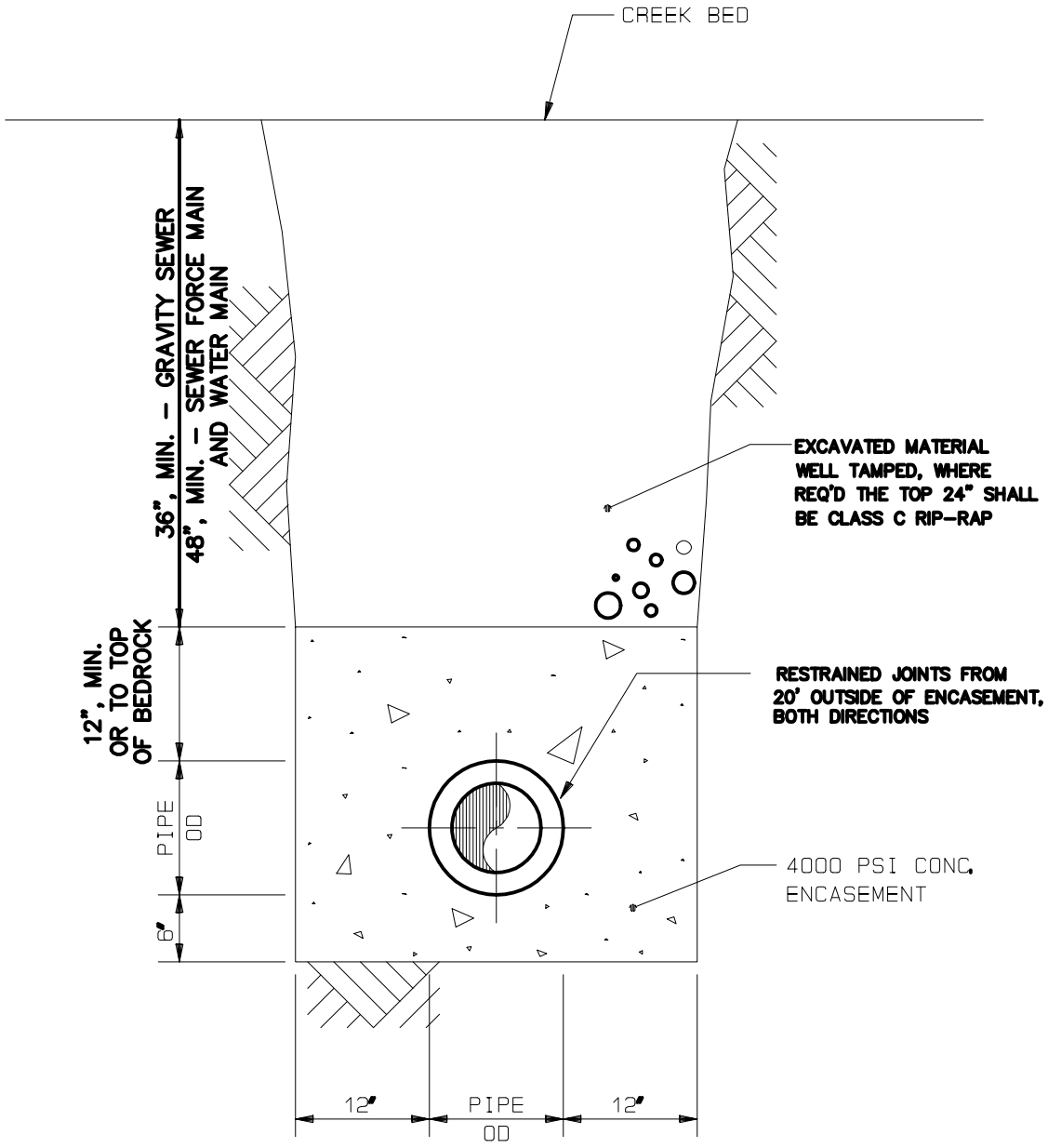
MINIMUM SPACING:

36' ON GRADES 15%–35%
24' ON GRADES 35%–50%
16' ON GRADES OVER 50%

SECTION

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT APPROVED _____ DATE _____ REVISED JUNE, 2013	KEYBLOCK ANCHORS FOR WATER OR SEWER MAINS ON STEEP SLOPES	DRAWING NO. G1.1.0



NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT APPROVED _____ DATE _____ REVISED MARCH, 2015	STREAM CROSSING CONCRETE ENCASEMENT DETAIL	DRAWING NO. G1.2.0

VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

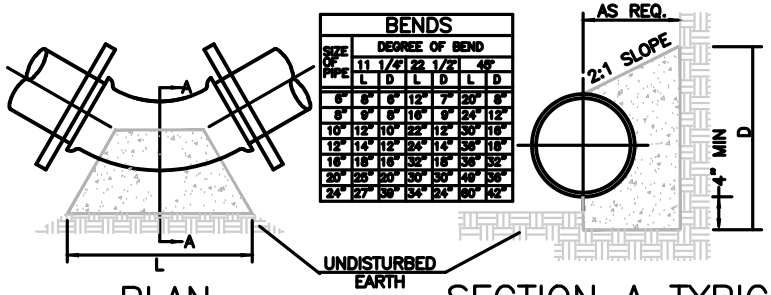
APPROVED _____

DATE _____

REVISED DEC. 2018

CONCRETE BLOCKING FOR PIPE FITTINGS ON WATER & FORCE MAINS

DRAWING NO. G1.3.0



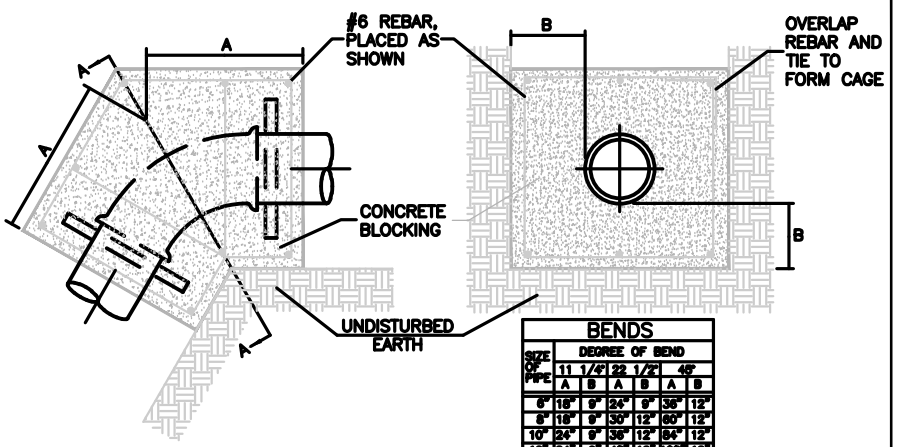
BENDS						
SIZE OF PIPE	DEGREE OF BEND					
	11 1/4°		22 1/2°		45°	
	L	D	L	D	L	D
6"	6"	6"	12"	7"	20"	8"
8"	9"	8"	16"	9"	24"	12"
10"	12"	10"	22"	12"	30"	16"
12"	14"	12"	24"	14"	36"	18"
16"	18"	16"	32"	18"	36"	32"
20"	25"	20"	30"	30"	48"	36"
24"	27"	30"	34"	24"	60"	42"

PLAN

SECTION A TYPICAL

BENDS 45° AND UNDER

N.T.S.



BENDS						
SIZE OF PIPE	DEGREE OF BEND					
	11 1/4°		22 1/2°		45°	
	A	B	A	B	A	B
6"	18"	6"	24"	9"	36"	12"
8"	18"	6"	30"	12"	60"	12"
10"	24"	6"	36"	12"	84"	12"
12"	24"	6"	48"	12"	108"	12"

ELEVATION

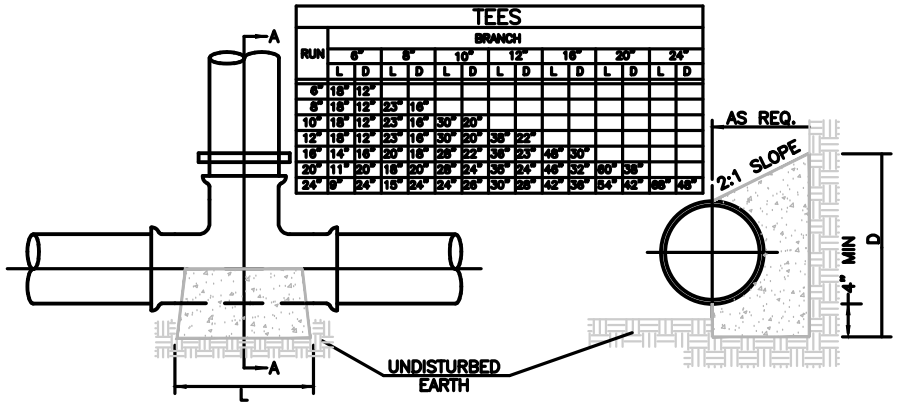
SECTION A TYPICAL

TOP VERTICAL BENDS

N.T.S.

BLOCKING NOTES:

1. BLOCKING SHALL BE CLASS "C" CONCRETE
2. BLOCKING REQUIRED AT ALL BENDS
3. FACE OF EACH BLOCK MUST BE PERPENDICULAR TO THE LINE OF THRUST
4. FITTINGS TO BE WRAPPED WITH 4 MIL PLASTIC TO PREVENT CONCRETE CONTACTING BOLTS, GLANDS, AND NUTS
5. CONCRETE TO BE POURED AGAINST UNDISTURBED EARTH ON THE THRUST SIDE
6. D.I. RETAINER GLANDS TO BE USED IN ADDITION TO CONCRETE THRUST BLOCKING
7. 3/4" REINFORCING BARS TO BE USED IN HIGH PRESSURE ZONES AS DIRECTED BY THE CCWRD
8. RUDIMENTARY FORMS USED TO CONTAIN CONCRETE IN THRUST AREA



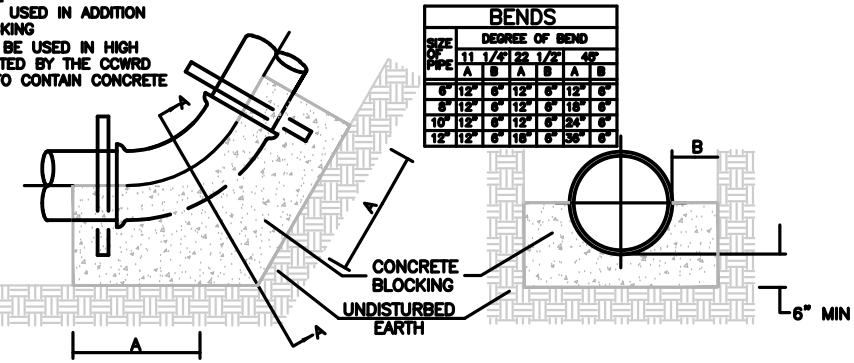
TEES														
RUN	BRANCH													
	6"		8"		10"		12"		16"		20"		24"	
	L	D	L	D	L	D	L	D	L	D	L	D	L	D
6"	18"	12"												
8"	18"	12"	23"	16"										
10"	18"	12"	23"	16"	30"	20"								
12"	18"	12"	23"	16"	30"	20"	36"	22"						
16"	14"	16"	20"	16"	28"	22"	36"	25"	48"	30"				
20"	11"	20"	16"	20"	28"	24"	36"	24"	48"	32"	60"	38"		
24"	9"	24"	15"	24"	24"	26"	30"	28"	42"	36"	54"	42"	66"	48"

PLAN

SECTION A TYPICAL

TEES

N.T.S.



BENDS						
SIZE OF PIPE	DEGREE OF BEND					
	11 1/4°		22 1/2°		45°	
	A	B	A	B	A	B
6"	12"	6"	12"	6"	12"	6"
8"	12"	6"	12"	6"	18"	6"
10"	12"	6"	12"	6"	24"	6"
12"	12"	6"	18"	6"	36"	6"

ELEVATION

SECTION A TYPICAL

BOTTOM VERTICAL BENDS

N.T.S.

GENERAL NOTES

GENERAL: ALL WORK AND MATERIALS SHALL CONFORM TO THE LATEST RULES AND REGULATIONS OF THE VILLAGE OF MT. ORAB UTILITY DEPARTMENT. IT IS THE INTENT OF THESE CONSTRUCTION DRAWINGS AND SPECIFICATIONS TO DESCRIBE A COMPLETE FUNCTIONING SYSTEM IN ALL RESPECTS, WHETHER OR NOT EVERY SUB-ELEMENT OF THE TOTAL SYSTEM IS ACTUALLY DEFINED IN WRITING AND/OR DETAIL. PAYMENT TO THE CONTRACTOR(S) SHALL BE INFERRED TO COVER WORK AND MATERIALS REQUIRED FOR A COMPLETE FUNCTIONING SYSTEM SUCH THAT WHEN FINAL PAYMENT IS MADE, THE SYSTEM IS COMPLETELY OPERABLE AND FUNCTIONS IN ALL RESPECTS AS REQUIRED BY THE CONTRACT DOCUMENTS.

THE WORK TO BE PERFORMED UNDER THESE SPECIFICATIONS INCLUDES FURNISHING ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY TO COMPLETE THE WORK CALLED FOR IN THE CONTRACT DOCUMENTS.

THE CONTRACTOR SHALL PROVIDE ALL NECESSARY ELECTRIC, WATER, SANITARY FACILITIES AND WASTE DISPOSAL TO COMPLETE THE WORK.

A SITE VISIT IS HIGHLY RECOMMENDED PRIOR TO SUBMISSION OF BID.

THE EXISTING WATER MAIN IS SHOWN BASED ON FIELD SURVEYS AND THE BEST AVAILABLE INFORMATION. THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO THE START OF WORK.

THE EXISTING WATER MAIN IS TO REMAIN IN SERVICE DURING CONSTRUCTION OF THE NEW WATER MAIN.

THE PROPOSED WATER MAIN SHALL BE INSTALLED AT A MINIMUM 4' BELOW THE PROPOSED GRADE OR AS DIRECTED BY THE ENGINEER.

CONTRACTOR IS RESPONSIBLE TO PROVIDE SUPPORT TO THE EXISTING UTILITY POLES, AS NECESSARY TO COMPLETE THE WORK CALLED FOR IN THE CONTRACT DRAWINGS AND SPECIFICATIONS.

PAVEMENT: ALL PAVEMENT AND/ROADWAY SURFACE DISTURBED BY THE CONTRACTOR, SHALL BE RESTORED BY THE CONTRACTOR AT HIS EXPENSE AND IN CONFORMANCE WITH THE REGULATIONS OF THE GOVERNING AUTHORITY OF SAID ROADWAYS. IN THE ABSENCE OF SUCH REGULATIONS, THE RESTORATION SHALL BE IN ACCORDANCE WITH INSTRUCTIONS BY THE OWNER'S REPRESENTATIVE WITH THE OBJECTION OF RESTORING THE PAVING OR ROADWAY SURFACE TO THE ORIGINAL CONDITION OF SAME.

RESTORATION: TEMPORARY RESTORATION AND RESTORATION OUTSIDE OF THE LIMITS OF THIS CONSTRUCTION PROJECT ARE THE RESPONSIBILITY OF THE CONTRACTOR. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE TO VIDEO TAPE AND PHOTOGRAPH ALL AREAS THAT WILL BE DISTURBED AS A RESULT OF HIS CONSTRUCTION ACTIVITIES AND WILL DELIVER TO THE OWNER'S REPRESENTATIVE A COPY OF THE VIDEO TAPE AND PHOTOGRAPHS. ALL PICTURES SHALL BE LABELED WITH THE LOCATION WHERE TAKEN. NONCOMPLIANCE MAY RESULT IN THE CONTRACTOR'S LIABILITY FOR ALL DISPUTED PROPERTY RESTORATIONS.

EROSION CONTROL: THE CONTRACTOR SHALL INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES AS NECESSARY TO COMPLETE THE WORK AS OUTLINED IN THESE DRAWINGS AND PROJECT SPECIFICATIONS AND TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE CLERMONT COUNTY WATER MANAGEMENT AND SEDIMENT CONTROL REGULATIONS AND TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE

MAILBOXES: CONTRACTOR SHALL REMOVE AND REPLACE MAILBOXES, AS NEEDED DURING CONSTRUCTION. CONTRACTOR IS ADVISED THAT ALL MAILBOXES MAY NOT BE SHOWN.

UTILITIES: THE EXISTENCE, LOCATION, AND CONDITION OF UTILITIES AND STRUCTURES, BOTH ABOVE AND BELOW GROUND, SHALL BE INVESTIGATED AND VERIFIED IN THE FIELD BY THE CONTRACTOR BEFORE STARTING WORK. EXCAVATION IN THE VICINITY OF SUCH UTILITIES AND STRUCTURES, SHALL BE DONE CAREFULLY AND BY HAND IF NECESSARY. THE CONTRACTOR SHALL PROTECT ALL SUCH UTILITIES AND STRUCTURES, BOTH MARKED AND UNMARKED, AND BE HELD RESPONSIBLE FOR DAMAGE TO SAME. THIS INCLUDES ALL EXISTING AND PROPOSED SPRINKLER AND ELECTRIC LINES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ISOLATE, BRACE, SUPPORT, SHEET, ETC. AND PROTECT THE EXISTING UTILITIES FROM MOVING EITHER HORIZONTALLY OR VERTICALLY. IF SUCH MOVEMENT DOES OCCUR DUE TO THE CONTRACTOR'S OPERATIONS, HE SHALL REPAIR THE UTILITY TO THE SATISFACTION OF THE UTILITY OWNER AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL GIVE WRITTEN NOTICE TO ALL OWNERS OF ADJACENT UTILITIES, FIXTURES, AND/OR PROPERTY, OF HIS IMPENDING OPERATIONS, BUT IN NO WAY SHALL SUCH NOTICE RELIEVE THE CONTRACTOR OF HIS LIABILITY FOR DAMAGES TO SAID UTILITIES, FIXTURES, AND/OR PROPERTY. THE CONTRACTOR SHALL CONTACT THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS IN ADVANCE OF EXCAVATION IN THE VICINITY OF SAID UTILITY. FIELD LOCATION SHALL BE MADE BY THE UTILITY OR ITS AUTHORIZED AGENCY BEFORE ANY WORK IS PERFORMED BY THE CONTRACTOR. IF AT ANYTIME DURING WORK, AN EXISTING UTILITY IS DAMAGED IN ANY WAY, THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE APPROPRIATE GOVERNING ENTITY AND THE OWNER'S REPRESENTATIVE.

SHUT DOWNS AND SCHEDULING.

- 1 WEEK TO PLAN
- 48 HOURS NOTICE TO AFFECTED CUSTOMERS REQUIRED PRIOR TO SHUTDOWNS
- CONTRACTOR REQUIRED TO DISTRIBUTE THE SHUT DOWN NOTICES PROVIDED BY THE OWNER
- SHUT DOWNS ARE TO BE PERFORMED AT NIGHT UNLESS PRIOR APPROVAL IS PROVIDED BY UTILITY DEPARTMENT

TESTING AND DISINFECTION OF WATER MAIN
THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO DISINFECT THE COMPLETE WATER PIPE LINE IN ACCORDANCE WITH AWWA C-651 AND AS DIRECTED BY THE OWNER'S REPRESENTATIVE. ALL PIPING AND APPURTANCES MUST BE PROPERLY DISINFECT WITH A MINIMUM OF 50 MILLIGRAMS PER LITER TOTAL CHLORINE RESIDUAL FOR 48 HOURS. THE PIPING MUST BE FLUSHED TO REMOVE ANY EXCESS CHLORINE. CHLORINE SOLUTION SHALL BE EVENLY APPLIED AND DISTRIBUTED THROUGHOUT THE PIPING.

A HYDROSTATIC TEST AS REQUIRED IN SECTION 4 OF THE STANDARD AWWA SPECIFICATIONS C-600 SHALL BE APPLIED TO INDIVIDUAL VALVED-OFF SECTIONS OF THE MAINS AND FIRE HYDRANT LEADS EITHER BEFORE OR AFTER THE TRENCH IS BACKFILLED. THE WATER MAIN SHALL BE TESTED AT 200 PSI, OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE, IN ANY SECTION BEING TESTED. THE DURATION OF EACH TEST SHALL BE AT LEAST TWO HOURS. SEE SPECIFICATION SECTION 2110, PART 3 – TESTING FOR ADDITIONAL DETAILS AND INFORMATION.

THE ONLY EXCLUSION OF TESTING IS TIE IN PIPING LESS THAN 18' IN LENGTH. IN THIS CASE, THE PIPE WILL BE SWABBED OR SPRAY DISINFECTED WITH CHLORINE SOLUTION, IN ACCORDANCE WITH AWWA C-857.

SPECS FOR PIPE, BENDS, VALVES AND APPURTANCES

PIPE SHALL BE PVC SDR-21 IN ACCORDANCE WITH ASTM D2241 UNLESS OTHERWISE NOTED. FOR ALL IN-GROUND INSTALLATIONS THE PRESSURE CLASS SHALL BE SDR-21/CLASS 200 (200 PSI MAX.), UNLESS A HIGHER CLASS IS REQUIRED BY LAYING CONDITIONS OR PRESSURE IN ACCORDNACE WITH ASTM D2241 AND APPROVED BY THE OWNER'S REPRESENTATIVE. ALL PIPES SHALL BE PROVIDED WITH JOINTS THAT MEET OR EXCEED ASTM D3139 FOR JOINT TIGHTNESS.

ALL FITTINGS, WALL PIPES AND SPECIALS SHALL BE OF DUCTILE IRON OR IN ACCRODANCE WITH ANSI A21.10 (AWWA C-153). ALL FITTINGS SHALL HAVE A BITUMINOUS COATED CEMENT LINING COMPLYING WITH AWWA C-104 AND SHALL HAVE AN OUTSIDE COATING COMPLYING WITH AWWA C-153 OR AN EPOXY COATING COMPLYING WITH AWWA C-116. ALL DUCTILE IRON FITTINGS SHALL BE PROVIDED WITH AND ASSEMBLED USING MECHANICAL JOINT ENDS AND RETAINER GLANDS.

CONCRETE THRUST BLOCKING, SUPPORTS AND/OR BUTTRESSES SHALL BE PROVIDED AT ALL TEES AND BENDS AND AT ANY OTHER LOCATIONS REQUIRED BY THE DISTRICT. THESE CONCRETE STRUCTURES SHALL BE BUILT TO THE LINES, GRADES AND DIMENSIONS SHOWN ON THE STANDARD DRAWINGS. CONCRETE USED FOR BLOCKING SHALL CONFORM TO CLASS C CONCRETE, HAVING A COMPRESSIVE STRENGTH OF 4,000 POUNDS PER SQUARE INCH. ALL CONCRETE SHALL BE MIXED BY MECHANICAL MEANS PRIOR TO INSTALLATION. THE INSTALLATION OF DRY CONCRETE WILL NOT BE PERMITTED.

PIPE JOINTS RESTRAINTS SHALL BE FIELD LOK GASKET, AMERICAN FAST GRIP, OR APPROVED EQUAL AS DETERMINED BY OWNER'S REPRESENTATIVE. EXCEPT AS MODIFIED HEREIN. ALL FIRE HYDRANT LEADS AND FIRE HYDRANT ASSEMBLIES SHALL BE RESTRAINED USING MEGALUG SERIES 1100 MECHANICAL JOINT RESTRAINT OR SIGMA CORPORATION ONE-LOCK SERIES SLDE MECHANICAL JOINT RESTRAINT FOR DUCTILE IRON PIPE OR APPROVED EQUAL AS DETERMINED BY OWNER'S REPRESENTATIVE.

POLYETHYLENE ENCASEMENT SHALL BE INSTALLED IN ACCORDANCE WITH ANSI/AWWA C105/A21.5 METHODS A OR B AND THE COUNTY'S SPECIFICATIONS. THE POLYETHYLENE ENCASEMENT SHALL BE A LOW-DENSITY POLYETHYLENE FILM MADE FROM VIRGIN LOW-DENSITY POLYETHYLENE RAW MATERIAL CONFORMING TO ASTM D4976 AND SHALL BE A MINIMUM OF EIGHT MILS IN THICKNESS.

GATE VALVES: ALL GATE VALVES SHALL CONFORM TO AWWA C-509 OR C-515 EXCEPT AS MODIFIED HEREIN. NEW GATE VALVES SHALL BE FULLY ENCAPSULATED RESILIENT WEDGE, PARALLEL SEATS, NON-RISING STEM, LEFT HAND OPEN (COUNTER CLOCKWISE), AND SHALL HAVE RUBBER "O"-RING, PACKING SEALS AND MECHANICAL JOINT ENDS WITH A 250 PSI PRESSURE RATING, UNLESS OTHERWISE APPROVED BY THE OWNER'S REPRESENTATIVE. INTERNAL VALVE COATING SHALL BE IN ACCORDANCE WITH AWWA-C550. APPROVED MODELS ARE: AMERICAN FLOW CONTROL SERIES 2200, MUELLER 2360, US PIPE METROSEAL 250, AND M&H 4067.

VALVE BOXES SHALL BE EQUAL TO F-2450 SERIES AS MANUFACTURED BY CLOW CORP OR SIGMA CORPORATION V6261-S. VALVE BOX ASSEMBLY SHALL BE OF CAST IRON WITH STAY PUT COVER AND PROPERLY SIZED BASE FOR THE VALVE BEING FITTED. COVER SHALL BE MARKED "WATER". ALL BOXES SHALL BE FURNISHED WITH THE NECESSARY EXTENSIONS TO BRING THE TOP OF THE BOX TO THE FINISHED GRADE.

BUTTERFLY VALVES: ALL BUTTERFLY VALVES SHALL CONFORM TO THE AWWA STANDARD SPECIFICATION FOR RUBBER SEATED BUTTERFLY VALVES, DESIGNATION AWA C-504 OF THE LATEST REVISION EXCEPT MODIFIED HEREIN. VALVES SHALL BE SUITABLE FOR FLOW IN EITHER DIRECTION AND SHALL BE BUBBLE TIGHT IN EITHER DIRECTION. WAFER VALVES SHALL NOT BE ACCEPTABLE. INTERNAL VALVE COATING SHOULD BE IN ACCORDANCE WITH AWWA-C550. VALVES SHALL BE AWWA CLASS 250B DESIGNED FOR 250 PSI NON-SHOCK SHUT-OFF PRESSURE AND A VELOCITY OF 16 FEET PER SECOND. VALVES AND APPURTANCES, INCLUDING OPERATORS, SHALL BE CAST IRON SUITABLE FOR BURIED AND SUBMERGED SERVICE. VALVES FOR USE WITH DUCTILE IRON PIPE SHALL HAVE MECHANICAL JOINT ENDS FURNISHED WITH HIGH STRENGTH CAST IRON TEE HEAD BOLTS AND HEX NUTS, AND RUBBER GASKETS. BODIES SHALL BE EITHER CAST IRON CONFORMING TO ASTM A126, CLASS B OR ASTM A48, CLASS 40 DUCTILE IRON CONFORMING TO ASTM A536 GRADE 65-45-12. UNLESS OTHERWISE APPROVED, SHAFTS SHALL BE STAINLESS STEEL CONFORMING WITH ASTM A276, TYPE 304, OR MONEL, TURNED, GROUND AND POLISHED AND SECURED TO THE VALVE DISC BY ONE OR MORE TANGENTIALLY FITTED MONEL OR STAINLESS STEEL TAPER PINS DRIVEN INTO REAMED TAPERED HOLES AND HELD SNUG BY MEANS OF A LOCKING NUT OR HEX-MATED TO VALVE DISC AND DESIGNED TO EXCLUDE EXPOSURE TO WATER. VALVES SHALL BE DESIGNED TO SEAT AT 90 DEGREES TO THE PIE AXIS AND SHALL BE CONSTRUCTED OF CORROSION-RESISTANT MATERIALS. SEATS SHALL BE OF A RUBBER COMPOUND COMPLYING WITH THE REQUIREMENTS OF SECTION 8 OF AWWA C-504-75. RUBBER SEATS SHALL BE ON THE BODY. OPERATORS SUITABLE FOR BURIED AND SUBMERGED SERVICE SHALL BE FURNISHED WITH EACH VALVE. OPERATORS SHALL BE DESIGNED TO DELIVER AN OUTPUT TORQUE TO THE VALVE SHAFT EQUAL TO THAT SHOWN ON THE FOLLOWING TABLE:

MAXIMUM OPERATING TORQUE:	VALVE DIAMETER(IN)	TORQUE(FT-LBS)
	3	19
	4	38
	6	83
	8	175
	10	320
	12	510
	14	720
	16	1030

OPERATORS SHALL BE DESIGNED TO PRODUCE THE SPECIFIED OUTPUT TOQUE WITH A MAXIMUM INPUT TORQUE OF 150 FOOT-POUNDS APPLIED TO THE OPERATING NUT. TRAVELING NUT TYPE OPERATORS SHALL BE TYPE NOT AS MANUFACTURED BY PRATT, OR APPROVED EQUAL. THE TOTAL NUMBER OF TURNS APPLIED TO THE WRENCH NUT REQUIRED TO COMPLETELY OPEN (CLOSE) THE VALVE FROM COMPLETELY CLOSED (OPEN) POSITION SHALL BE NOT LESS THAN TWICE THE NOMINAL VALVE DIAMETER IN INCHES FOR VALVES LESS THAT 16 INCHES IN DIAMETER AND SHALL BE NOT LESS THAN 30 TURNS FOR 16 INCH AND LARGER VALVES. ALL OPERATORS SHALL BE LEFT-HAND (COUNTER CLOCKWISE) OPENING.

APPROVED BUTTERFLY VALVES ARE: DEZURIK-250B, MUELLER LINESEAL XP-250B OR HENERY PRATT COMPANY-MODEL HP-250.

VALVE BOXES SHALL BE EQUAL TO F-2450 SERIES AS MANUFACTURED BY CLOW CORP OR SIGMA CORPORATION V6261-S. VALVE BOX ASSEMBLY SHALL BE OF CAST IRON WITH STAY PUT COVER AND PROPERLY SIZED BASE FOR THE VALVE BEING FITTED. COVER SHALL BE MARKED "WATER". ALL BOXES SHALL BE FURNISHED WITH THE NECESSARY EXTENSIONS TO BRING THE TOP OF THE BOX TO THE FINISHED GRADE.

WATER SERVICE, FITTINGS, AND METER SETTING
THE VILLAGE OF MT. ORAB UTILITY DEPARTMENT DOES NOT ALLOW DIRECT TAPS.

CORPORATION STOPS- APPROVED CORPORATION STOPS SHALL BE:
¾" AND 1"- FORD METER BOX COMPANY FB1000-3-G-NL.
1 ½"- FORD METER BOX COMPANY FB1000-6-G-NL
2" – FORD METER BOX COMPANY FB1000-7-G-NL

WATER SERVICE LINES, WHICH EXTEND FROM THE WATER MAIN TO 3' BEYOND THE METER, SHALL BE SDR 9 CTS TUBING CONFORMING TO ASTM D-2737 SPECIFICATIONS.

METER BOXES SHALL BE:
¾" METER – 18" TILE
1" METER – 18" TILE
1 ½" AND 2" – 36" TILE
OR APPROVED EQUAL.

ALL METERS USED IN THE VILLAGE OF MT. ORAB UTILITY DEPARTMENT DISTRIBUTION SYSTEM MUST BE PURCHASED FROM THE UTILITY DEPARTMENT AND INSTALLED ACCORDING TO THE UTILITY DEPARTMENT STANDARD DRAWINGS. WHERE EXISTING WATER SERVICES ARE BEING RELOCATED OR RECONNECTED, THE EXISTING WATER METER CAN BE RE-USED.

ANGLE VALVES FOR RELOCATED ¾" X ¾" AND 1" WATER METERS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE AND INSTALLED ACCORDING TO THE VILLAGE OF MT. ORAB UTILITY DEPARTMENT STANDARD DRAWINGS:

METER SIZE	ANGLED YOKE VALVE, W/ BACKLOCK WING	ANGLED CHECK VALVE
¾" X ¾"	FORD AV84-323-WG-NL OR APPROVED EQUAL	FORD HA84-323-G-NL OR APPROVED EQUAL
1"	FORD AV84-444-WG-NL OR APPROVED EQUAL	FORD HA81-444-NL-W OR APPROVED EQUAL

THE EXISTING WATER METER, YOKE AND EXPANSION WHEEL ASSEMBLY SHALL BE RE-USED AND RE-INSTALLED BY THE CONTRACTOR.

METER ASSEMBLIES FOR 1 ½" AND 2" DOMESTIC METERS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE AND INSTALLED ACCORDING TO VILLAGE OF MT. ORAB UTILITY DEPARTMENT STANDARD DRAWINGS: 1 ½" METERS- FORDVH176-18-11-66-G-NL, 2" METERS- FORD VH177-18-11-77-G-NL.

COMPRESSION FITTINGS USED FOR RELOCATED AND RECONNECTED WATER METERS SHALL BE FORD GRIP JOINT COUPLING (C44-XX-G-NL STYLE), FORD PACK JOINT COUPLING (C44-XX-NL STYLE), OR APPROVED EQUAL.

CONTRACTOR MUST SUBMIT LITERATURE AND/OR CATALOG CUT SHEETS FOR REVIEW AND APPROVAL PRIOR TO ORDERING OF ALL MATERIAL AND FITTINGS TO BE USED ASSOCIATED WITH THE INSTALLATION OF 2" AND SMALLER SIGNLE, DOMESTIC WATER SERVICES.

SUBMIT LITERATURE DETAILING THE CONSTRUCTION METHOD TO BE USED TO PROVIDE TRENCHLESS INSTALLATION OF WATER SERVICES FOR REVIEW AND APPROVAL. TRENCHLESS SERVICE LINE INSTALLATION IS REQUIRED FOR ALL SERVICES CROSSING PUBLIC ROADWAYS.

GENERAL WATER NOTES

W1.0.0

VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

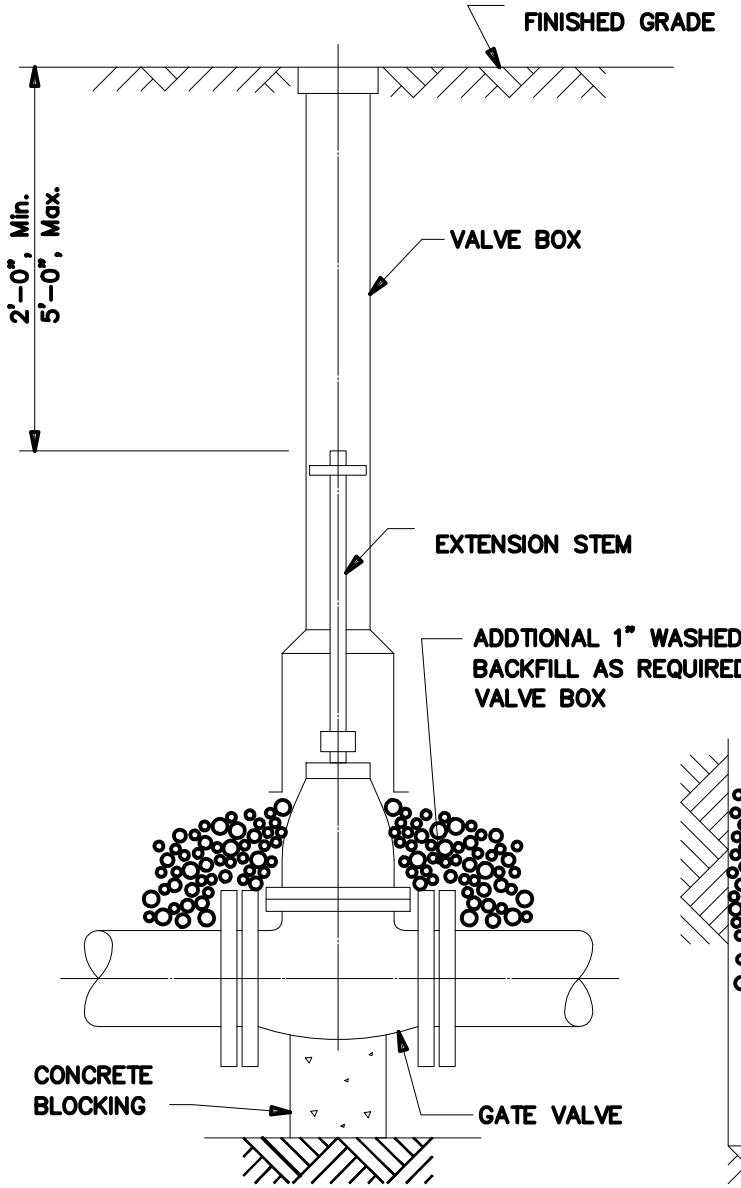
APPROVED _____

DATE _____

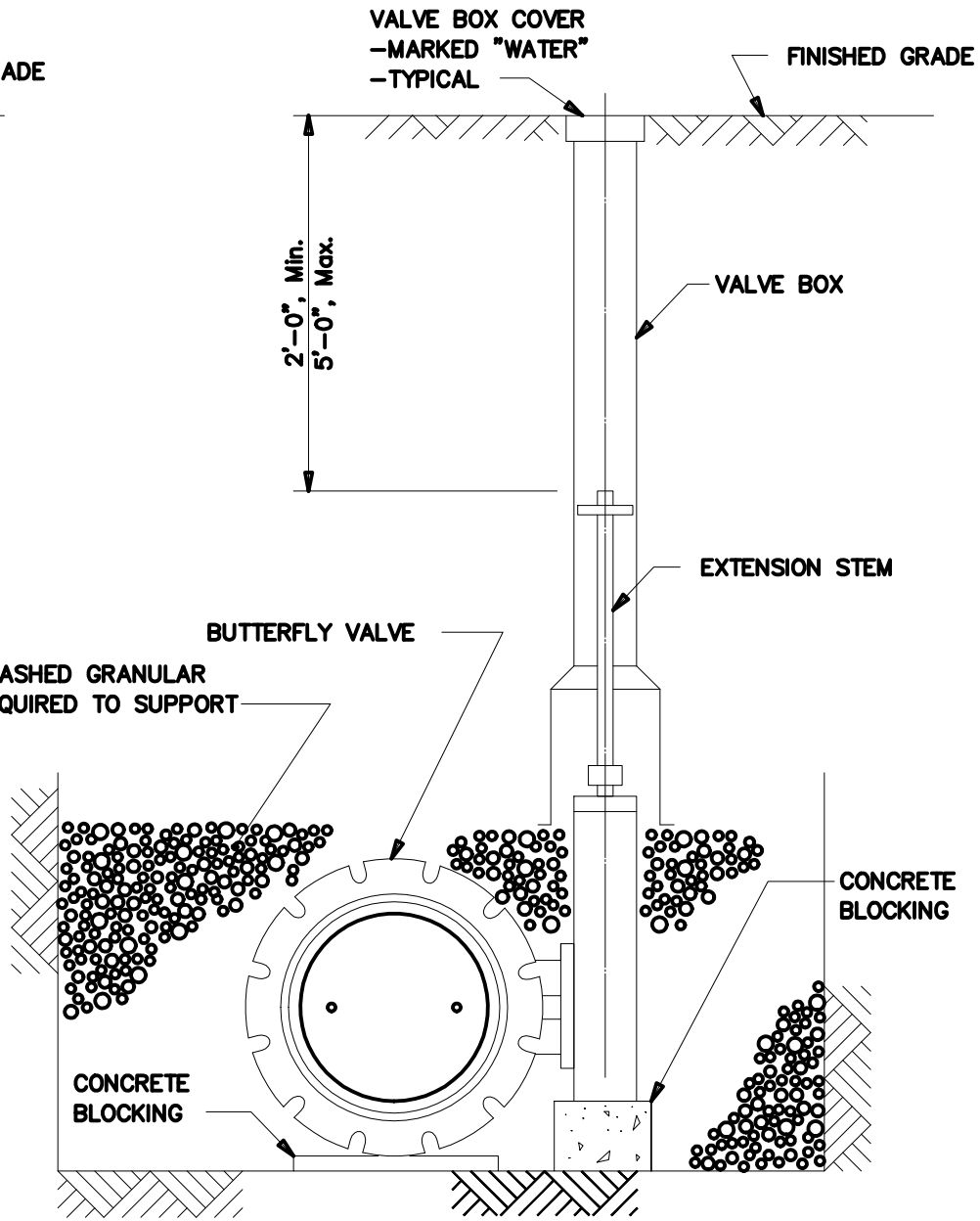
GATE & BUTTERFLY VALVES

DRAWING NO. W1.1.0

NO SCALE



GATE VALVE BOX



BUTTERFLY VALVE BOX

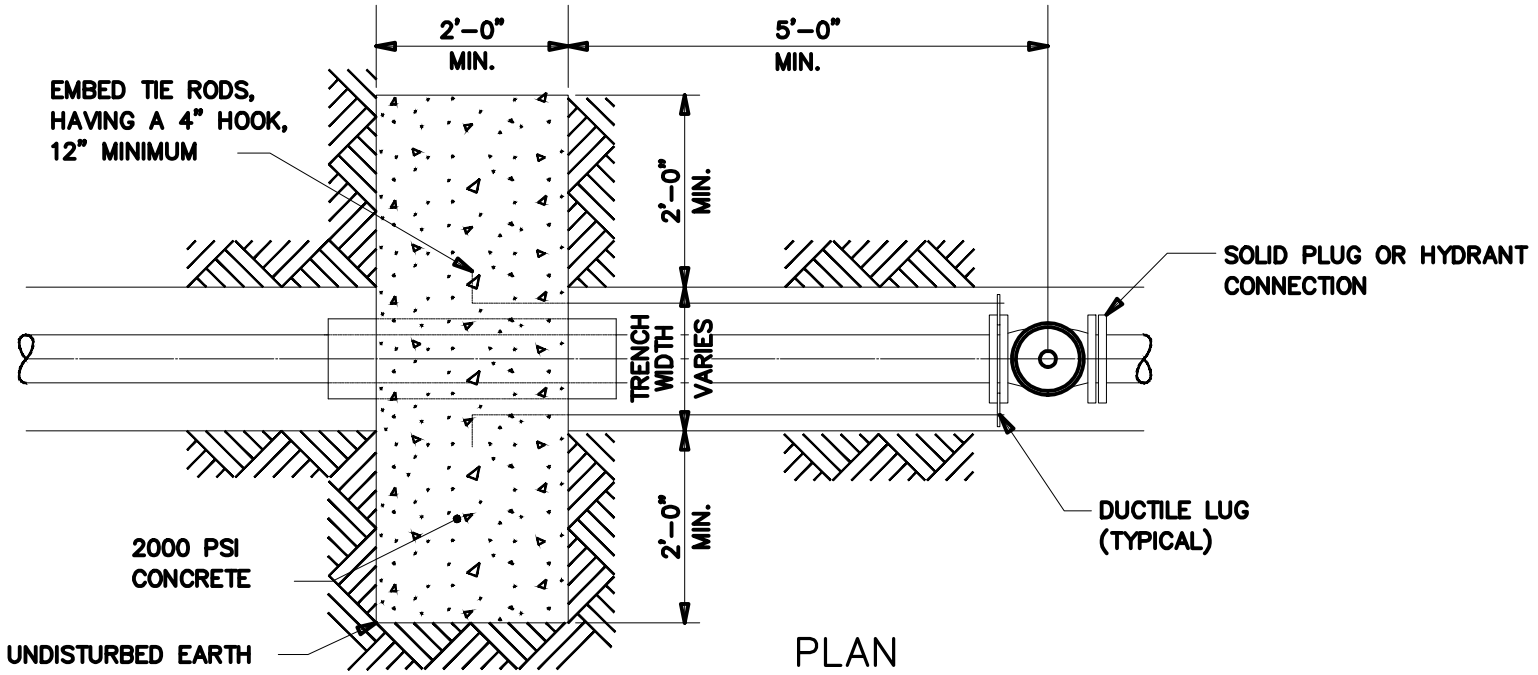
VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

APPROVED _____

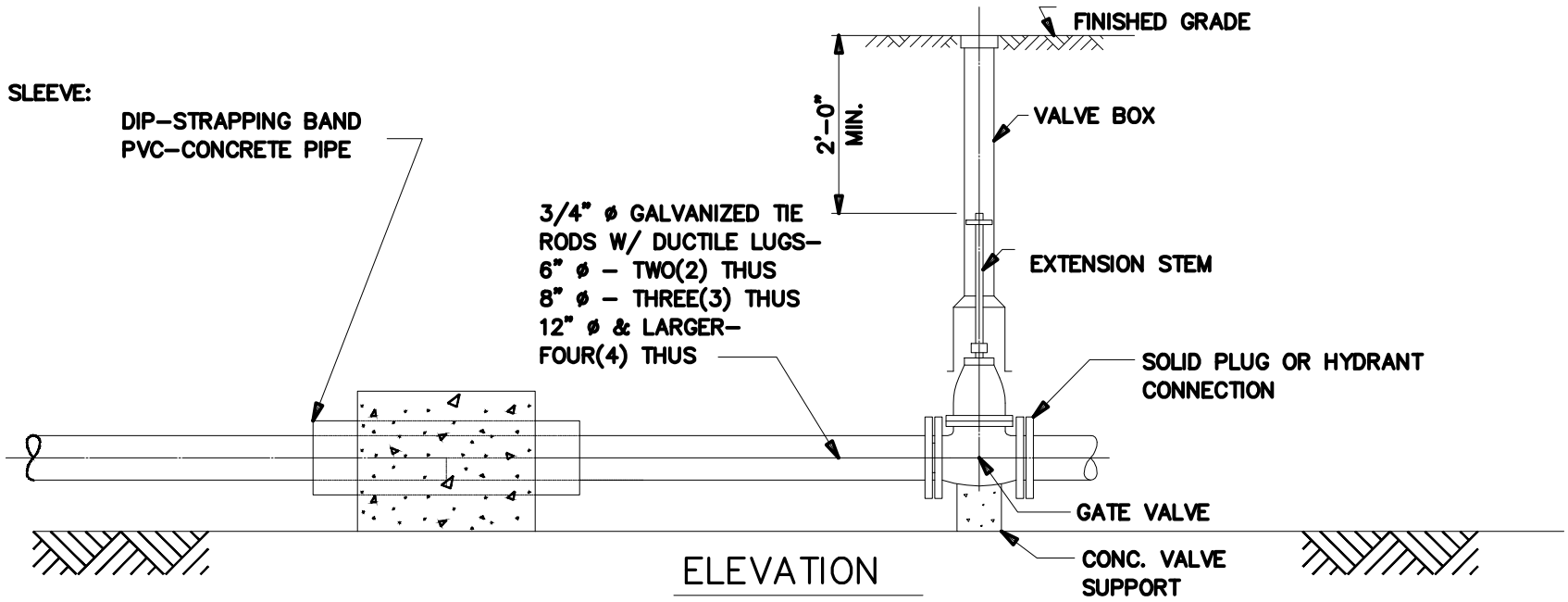
DATE _____

VALVE RESTRAINT BLOCKING

DRAWING NO. W1.2.0

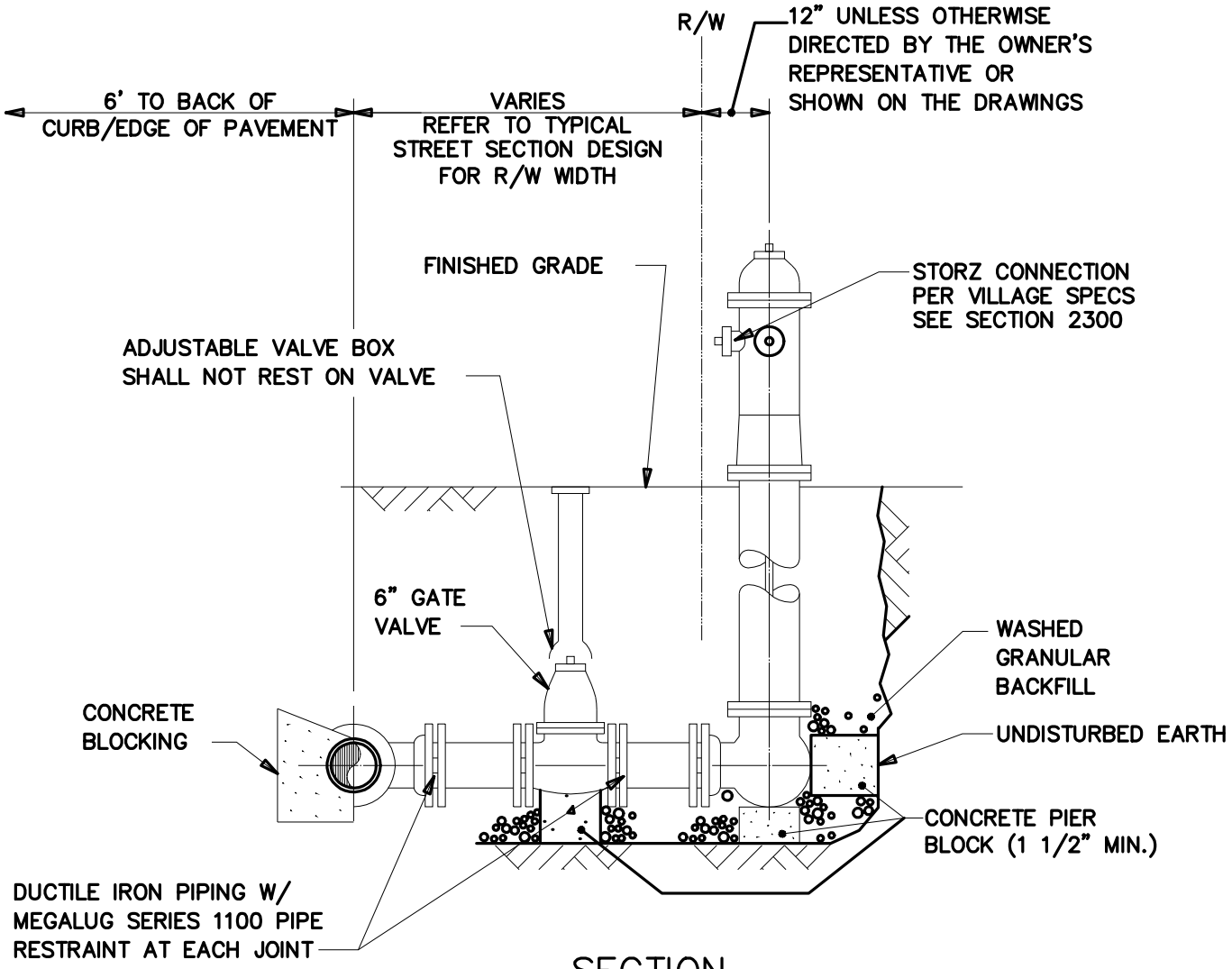


PLAN

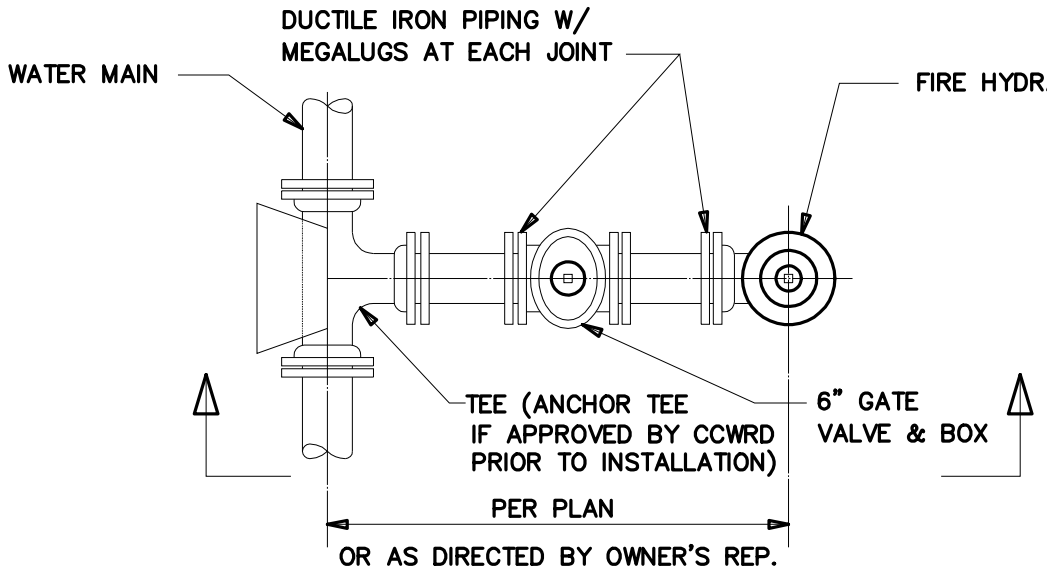


ELEVATION

NO SCALE



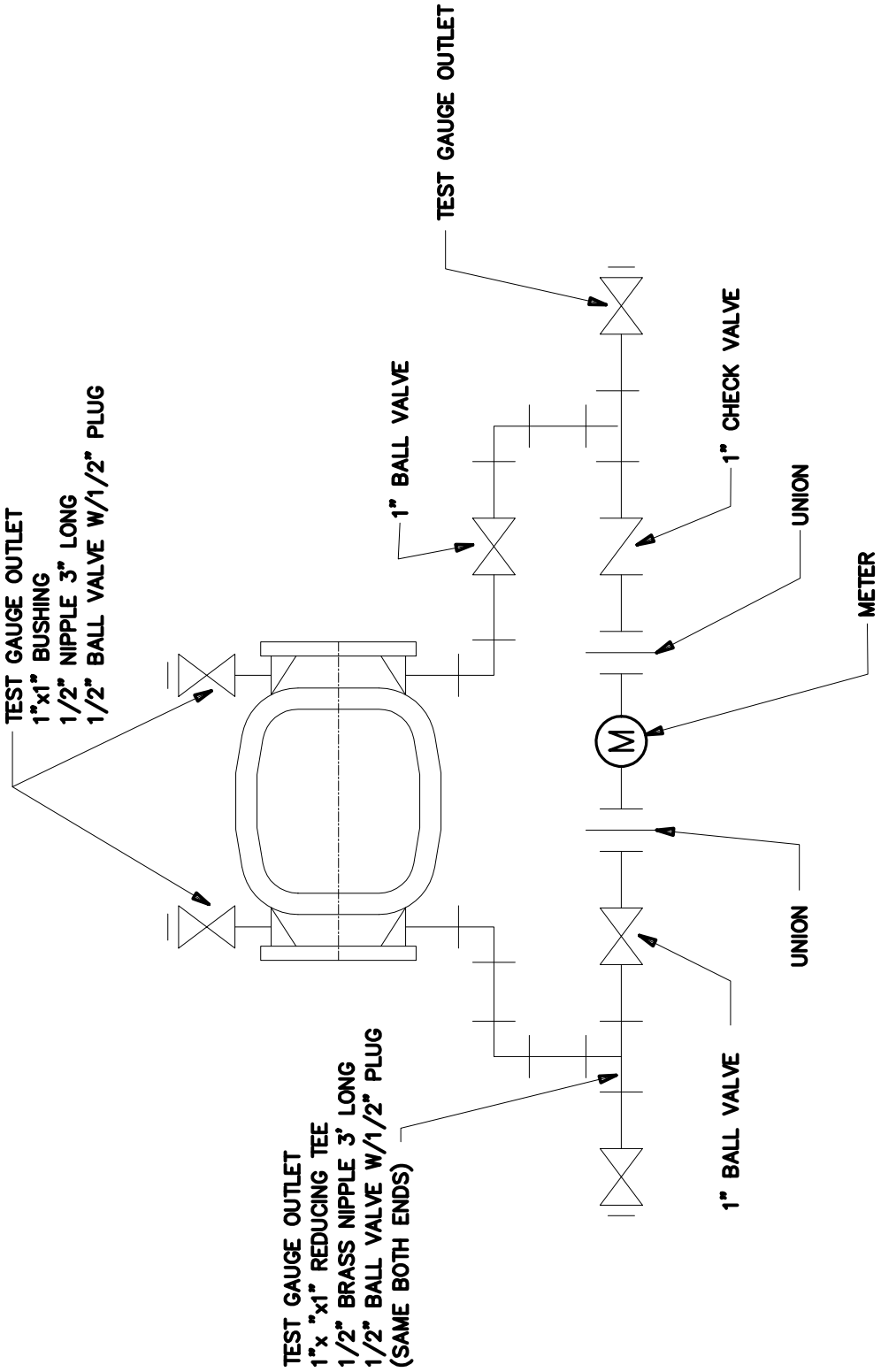
SECTION



PLAN

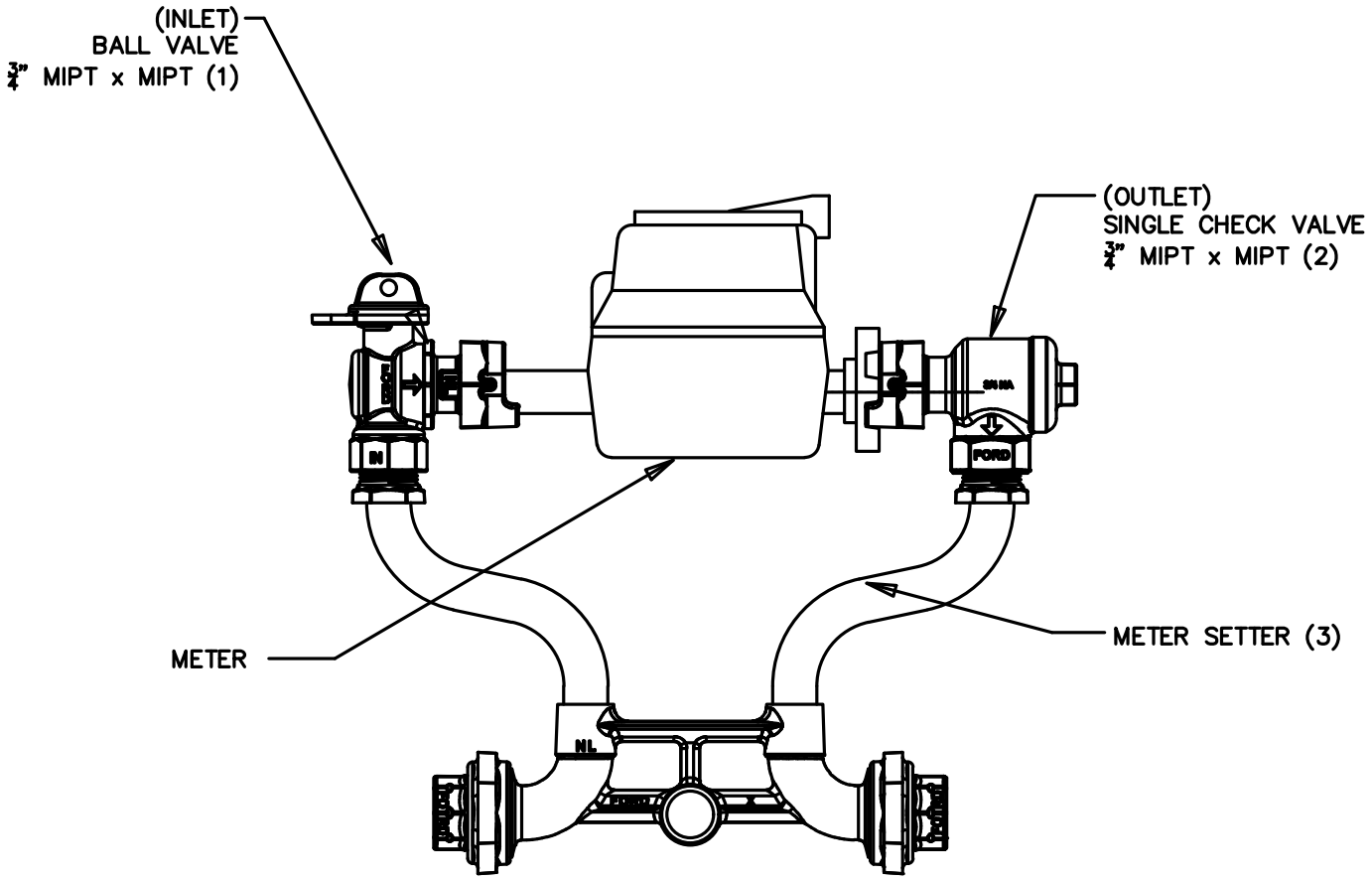
NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	FIRE HYDRANT LAYOUT & ASSEMBLY	DRAWING NO. W2.1.0
APPROVED _____ DATE _____		



NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	DETECTOR CHECK VALVE ASSEMBLY	DRAWING NO. W3.1.0
APPROVED _____ DATE _____		



$\frac{5}{8}$" X $\frac{3}{4}$" & 1" METERS

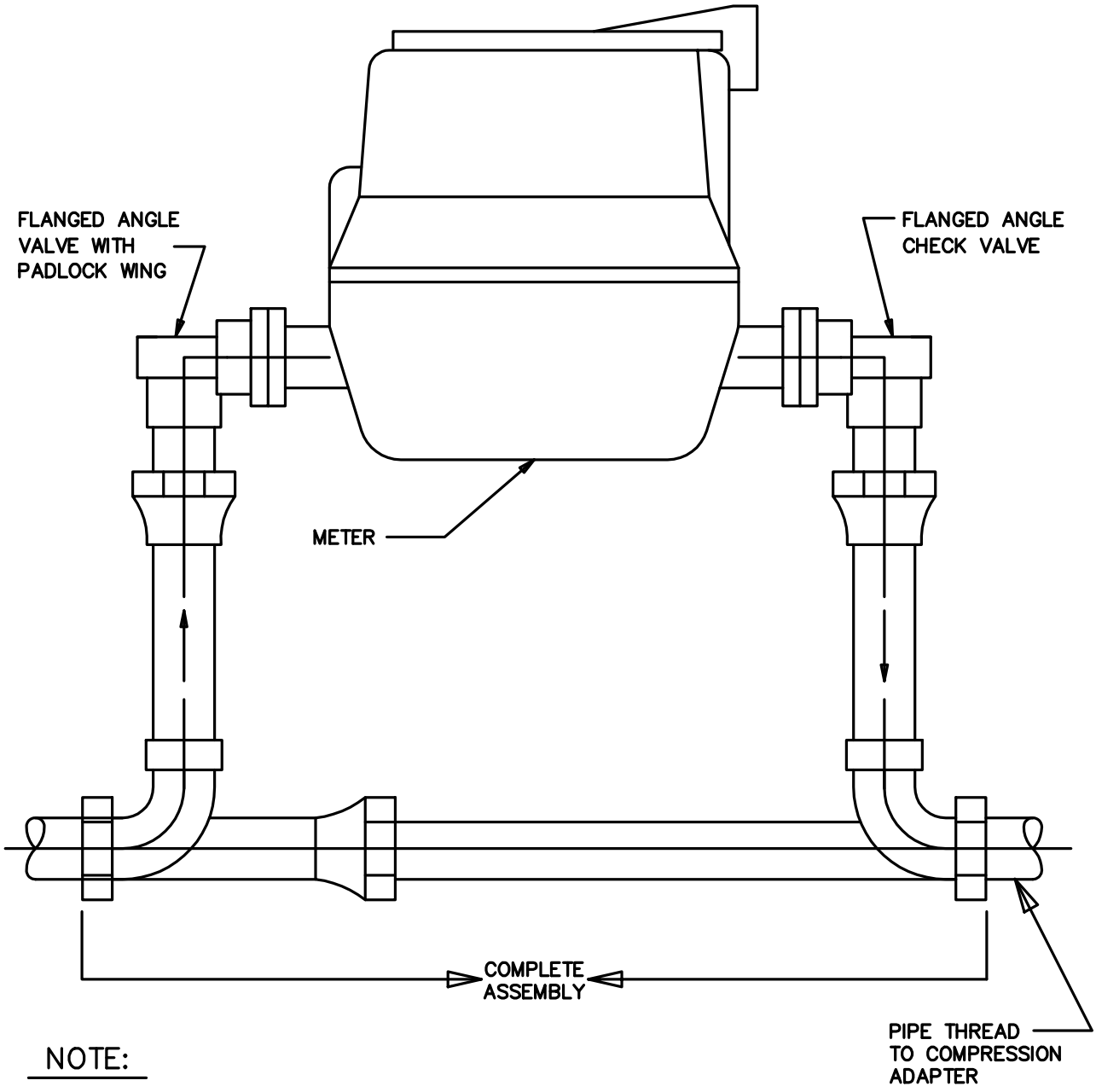
NOTES:

1. METERS SHALL BE PURCHASED FROM THE VILLAGE UTILITY DEPT.
2. THE VILLAGE UTILITY DEPT. MAKES ALL TAPS FOR NEW SERVICES.

METER SIZE	1	2	3
5/8" X 3/4"	BALL VALVE	SINGLE CHECK VALVE	FORD VBH72-12W-33-NL
1"	BALL VALVE	SINGLE CHECK VALVE	FORD VBH72-12W-44-44-NL

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	5/8" X 3/4" & 1" DOMESTIC METERS ASSEMBLY	DRAWING NO. W3.2.0
APPROVED _____ DATE _____ REVISED MAY 2025		



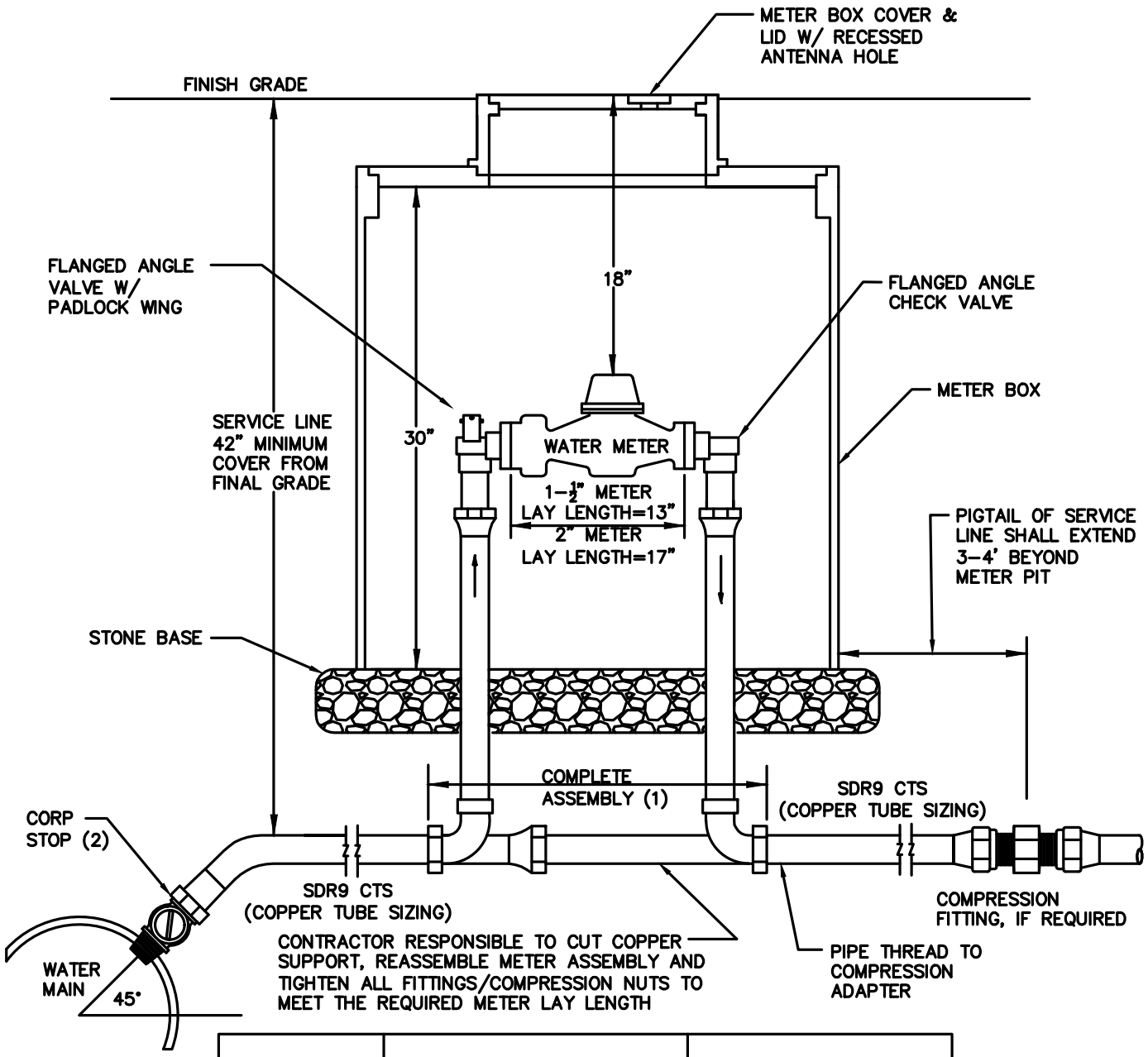
NOTE:

1. METERS SHALL BE PURCHASED FROM CCWRD
2. COMPLETE ASSEMBLY TO BE USED.

METER SIZE	COMPLETE ASSEMBLY
1 1/2"	VH76-18-11-66-G-NL
2"	VH77-18-11-77-G-NL

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT APPROVED _____ DATE _____ REVISED DEC 2013	1-1/2" & 2" DOMESTIC CUSTOM METER ASSEMBLY	DRAWING NO. W3.3.0



METER SIZE	COMPLETE ASSEMBLY (1)	CORP STOP (2)
1 1/2"	FORD VH76-18-11-66-G-NL OR APPROVED EQUAL	FORD FB1000-6-G-NL OR APPROVED EQUAL
2"	FORD VH77-18-11-77-G-NL OR APPROVED EQUAL	FORD F1000-7-G-NL OR APPROVED EQUAL

NOTES:
1. WATER METER COMPLETE ASSEMBLY IS PROVIDED AND PROGRAMMED BY COUNTY. CONTRACTOR IS RESPONSIBLE FOR INSTALLATION AND THE COST OF THE METER AND ANTENNA. ANTENNA IS NOT SHOWN FOR CLARITY.
2. METER BOX SHALL BE OLD CASTLE HEAVY WALL 0030-30 H BODY MS3030B.
3. COMPRESSION FITTINGS SHALL BE FORD GRIP JOINT COUPLING (C44-XX-G-NL) STYLE, FORD PACK JOINT COUPLING (C44-XX-NL) STYLE, OR APPROVED EQUAL.
4. FORD BRASS SADDLE (SERIES S70) WITH COPPER CONNECTION (CC) THREAD OUTLET FOR SDR21 OVC WATER MAIN.
5. (FL36) MONITOR FLANGE FOR 36" TILE
   20" MONITOR RING (ONLY PR)
   (RML-1-T) ONE HOLE 20" MONITOR LID (TR)

NOT TO SCALE

VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

APPROVED _____

DATE _____

1-1/2" & 2" METER BOX DETAIL

DRAWING NO.

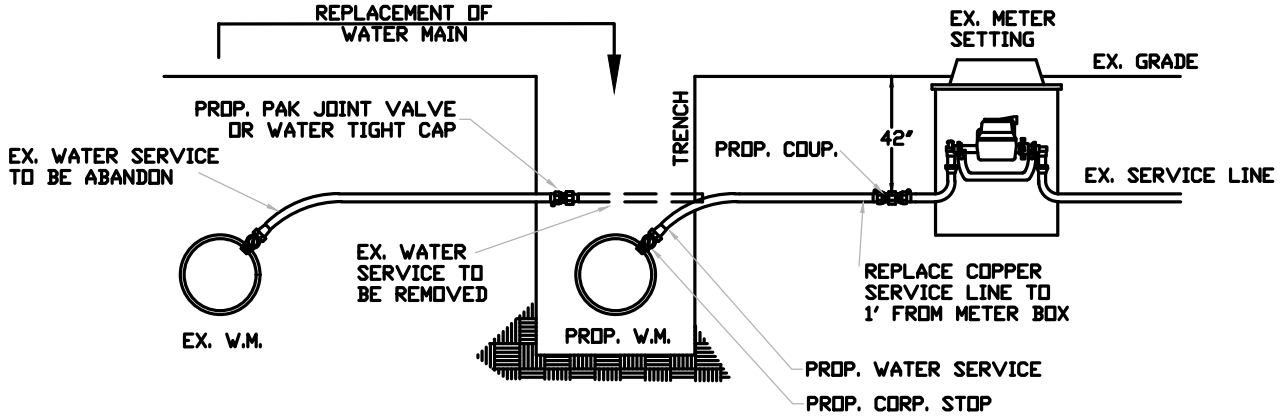
W3.3.1

DECEMBER 2020

WATER MAIN RELOCATION–SERVICE RECONNECTIONS

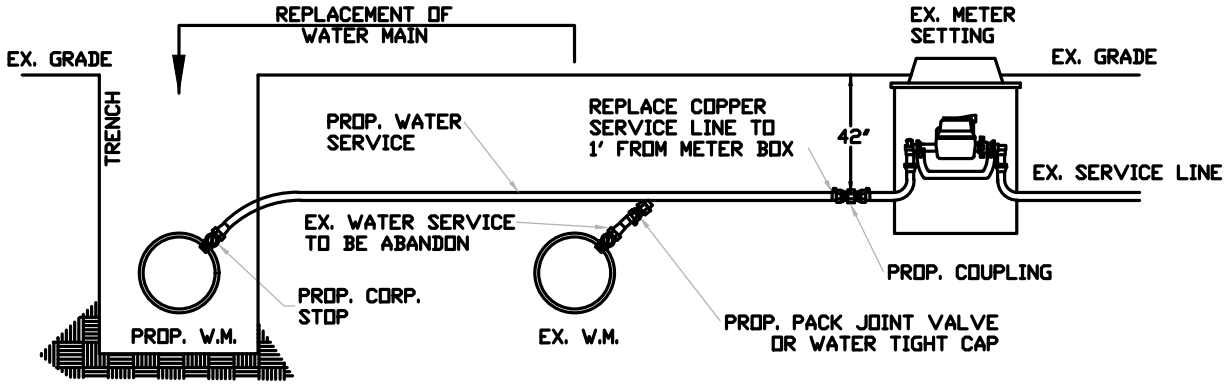
TYPE 1 CONNECTION

PROPOSED WATER MAIN INSTALLED BETWEEN THE EXISTING WATER MAIN AND THE WATER METER (SHORTER SERVICE)



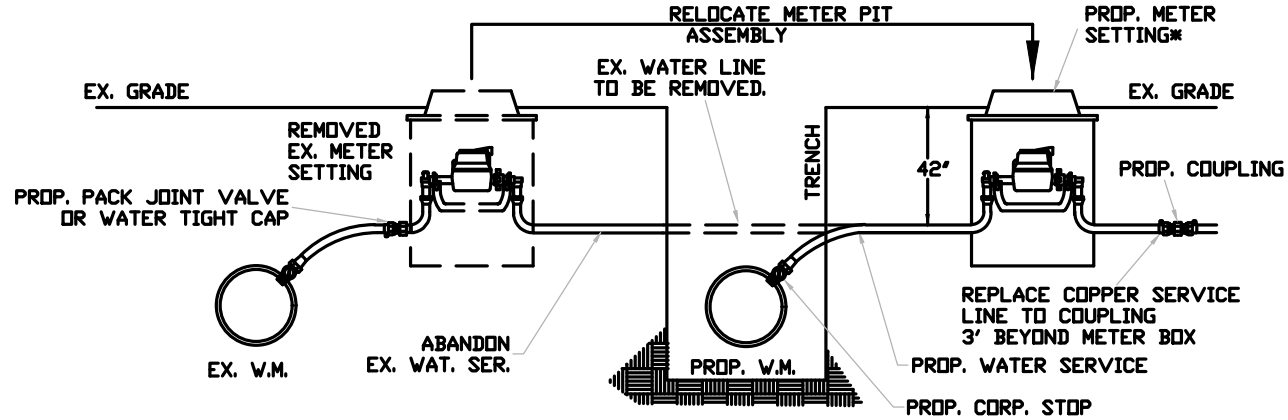
TYPE 2 CONNECTION

PROPOSED WATER MAIN INSTALLED ON OPPOSITE SIDE OF EXISTING WATER MAIN, FROM THE METER SETTING (LONG SERVICE)



TYPE 3 CONNECTION

PROPOSED WATER MAIN IS INSTALLED BEHIND THE EXISTING WATER METER (MOVE WATER METER)



*METER SETTING, METER, AND METER BOX SHALL BE REPLACED. THE METER SHALL BE SUPPLIED BY COUNTY. EXISTING LID TO BE REUSED.

CONTRACTOR TO FREEZE SERVICE TO MAKE ALL CONNECTIONS. NO CRIMPING WILL BE PERMITTED.
CONTRACTOR TO CAP ALL WATER SERVICE LINES TO BE ABANDONED.

ALL NEW PIPE, FITTINGS & FIXTURES SHALL MEET THE NEW EPA LEAD-FREE RULES.

NOT TO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	WATER SERVICE CONNECTION DETAIL	DRAWING NO. W3.4.0
APPROVED _____ DATE _____		

REVISED APRIL 2016

VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

APPROVED _____

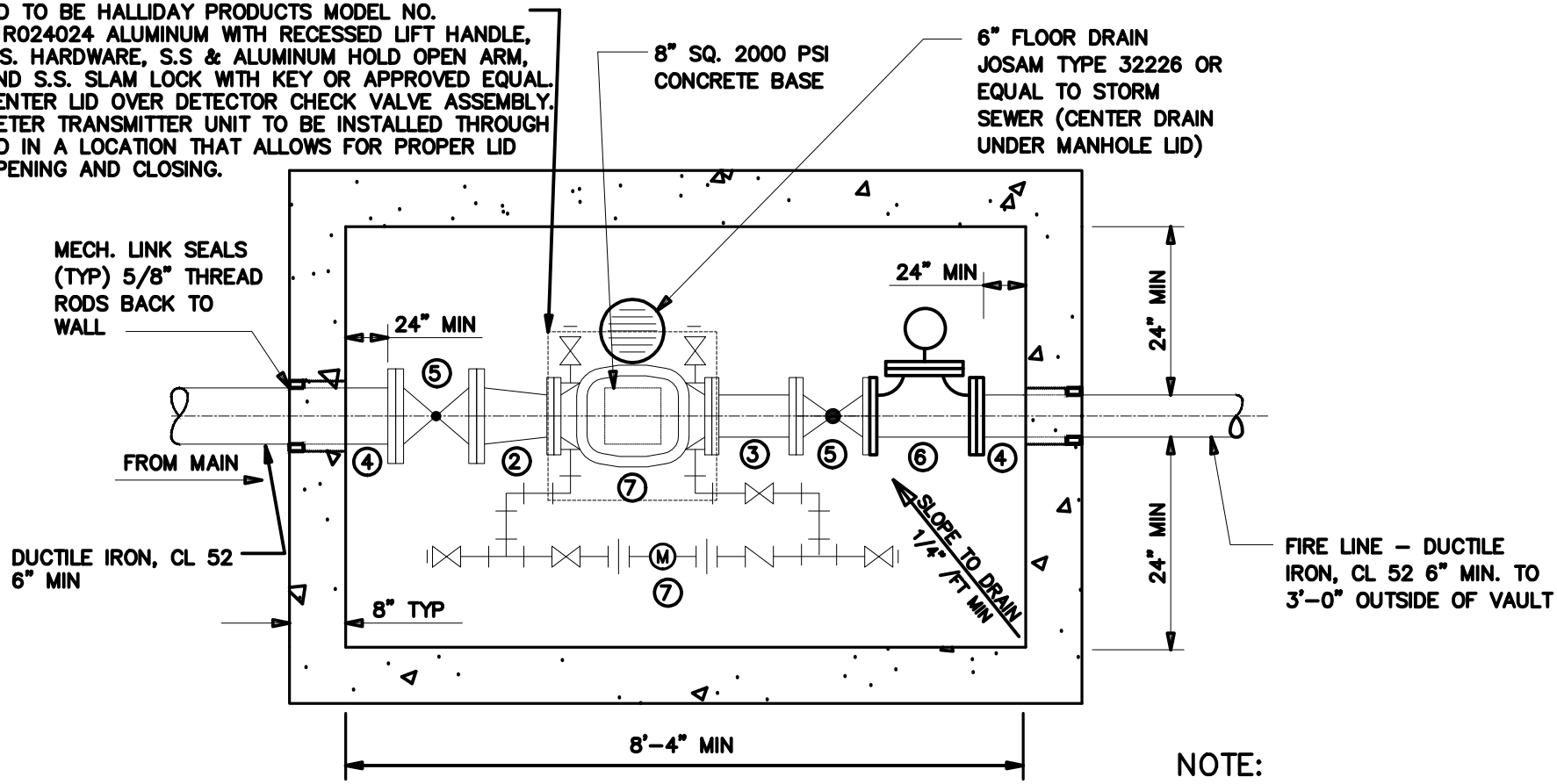
DATE _____

REVISED DEC. 2018

FIRE PROTECTION WITH DETECTOR CHECK

DRAWING NO. W4.1.0

NO SCALE



NOTE:

SEE CCWRD STANDARD DWGS W4.5 & W4.6 FOR WATER SYSTEM CHAMBER DETAILS

① DETECTOR CHECK VALVE ASSEMBLY. SEE CCWRD STD. DWG. W3.1

② FLANGED CONCENTRIC REDUCER

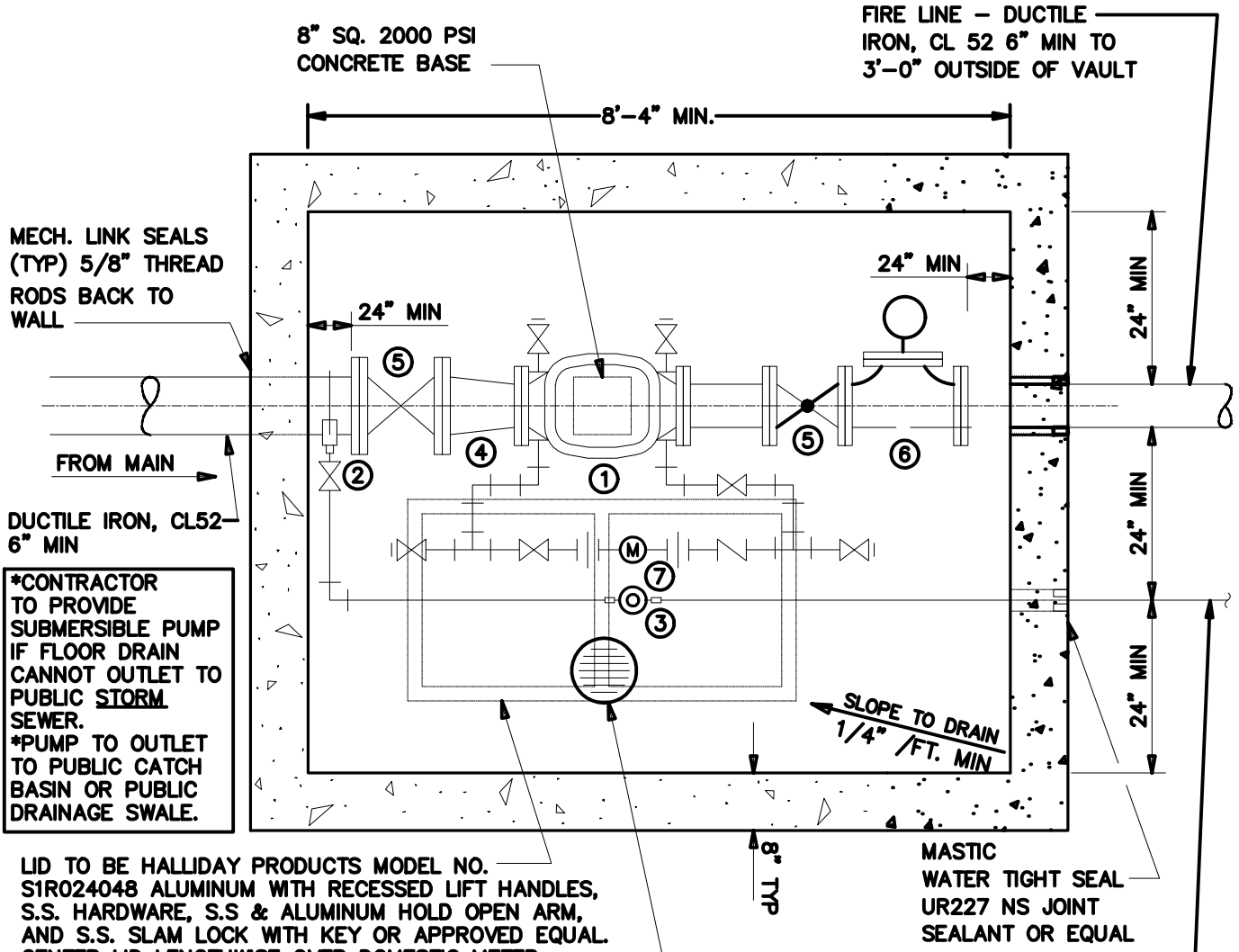
③ FLANGED SPOOL x 12" LENGTH

④ FLANGED – PLAIN END (3' MIN. LENGTH)

⑤ FLANGED INDICATOR GATE VALVE W/ HANDWHEEL OR POST INDICATOR VALVE, AS REQUIRED BY FIRE DEPARTMEMT
ELECTRONIC SUPERVISION OF VALVE AS REQUIRED

⑥ FIRE DEPARTMENT CONNECTION AND/OR FIRE ALARM SYSTEM, IF REQUIRED BY FIRE DEPARTMENT

⑦ LEAK DETECTOR – SENSUS 1" ACCUSTREM WATER METER WITH TRANSMITTER UNIT, PURCHASED FROM THE COUNTY



① DETECTOR CHECK VALVE ASSEMBLY SEE CCWRD STD. DWG. W3.1

② TAPPING SADDLE & CORPORATION STOP

③ DOMESTIC METER – SEE CCSD STD. DWGS. W3.2 & W3.3

④ FLANGED CONCENTRIC REDUCER

⑤ FLANGED INDICATOR GATE VALVE W/ HANDWHEEL OR POST INDICATOR VALVE, AS REQUIRED BY FIRE DEPARTMENT ELECTRONIC SUPERVISION OF VALVE AS REQUIRED

⑥ FIRE DEPARTMENT CONNECTION

⑦ LEAK DETECTOR – SENSUS 1" ACCUSTREM WATER METER WITH TRANSMITTER UNIT, PURCHASED FROM THE COUNTY.

NOTE:

SEE CCWRD STANDARD DWGS W4.5 & W4.6 FOR WATER SYSTEM CHAMBER DETAILS

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	DUAL SERVICE BRANCH SETTING– DOMESTIC METERS (2" & SMALLER)	DRAWING NO. W4.2.0
APPROVED _____ DATE _____ REVISED DEC. 2020		

VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

APPROVED _____

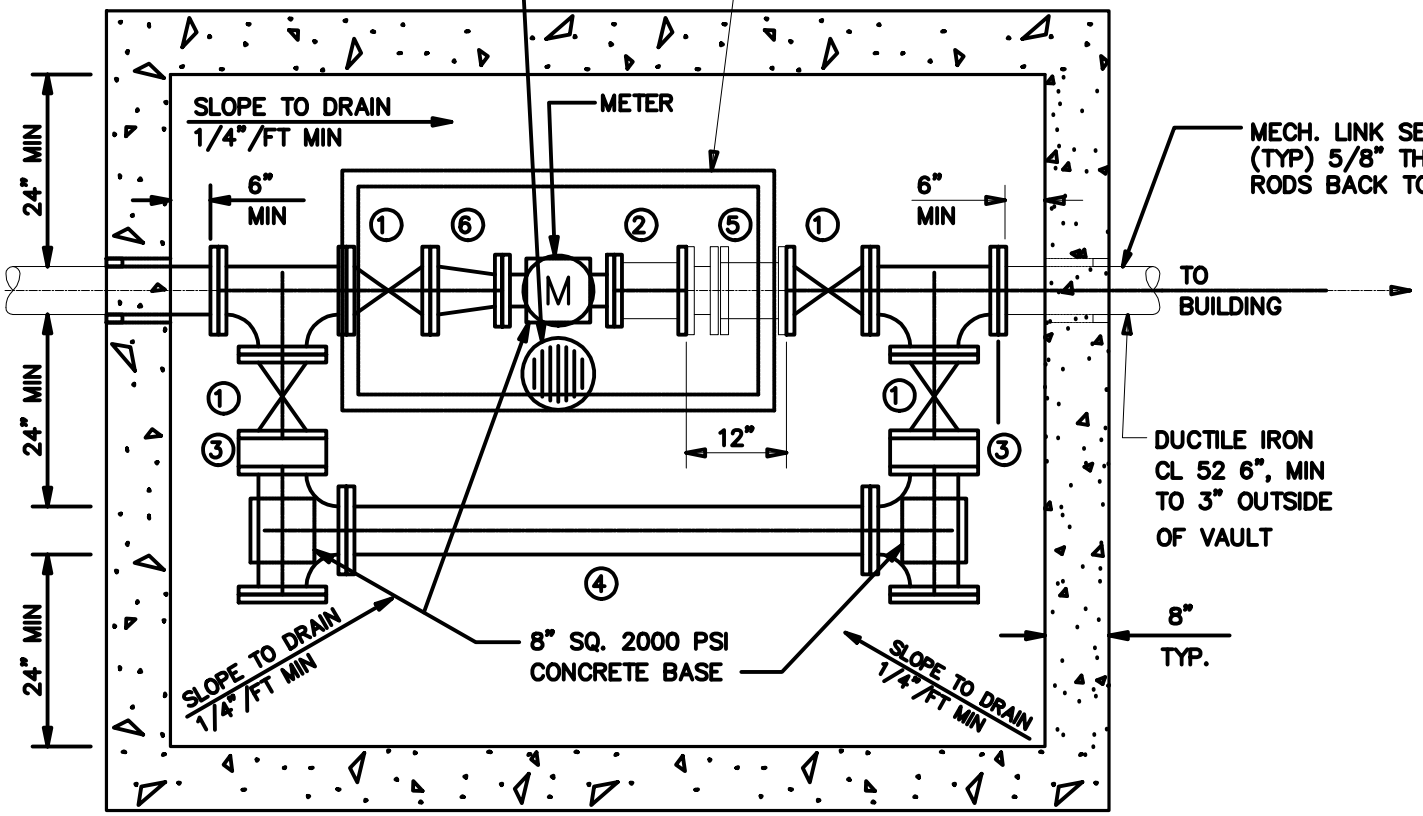
DATE _____

REVISED JUNE 2016

3" & LARGER STANDARD METER PIT ARRANGEMENT

DRAWING NO. W4.3.0

NO SCALE



① FLANGED INDICATOR GATE VALVE W/ HANDWHEEL

② FLANGED SPOOL OR SPACER

③ FILLER FLANGE OR SPOOL PIECE AS RQUIRED

④ BY-PASS LINE TO BE SAME SIZE AS DOMESTIC LINE

⑤ FLANGED ADAPTER EQUAL TO DRESSER STYLE 128 WITH 2" NPT TAP & PLUG (TEST PORT)

⑥ FLANGED STRAINER

NOTE:

SEE CCWRDD STANDARD DWGS W4.5 & W4.6 FOR WATER SYSTEM CHAMBER DETAILS

VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

APPROVED _____

DATE _____

REVISED DEC. 2020

DUAL SERVICE BRANCH SETTING– 3" & LARGER METERS

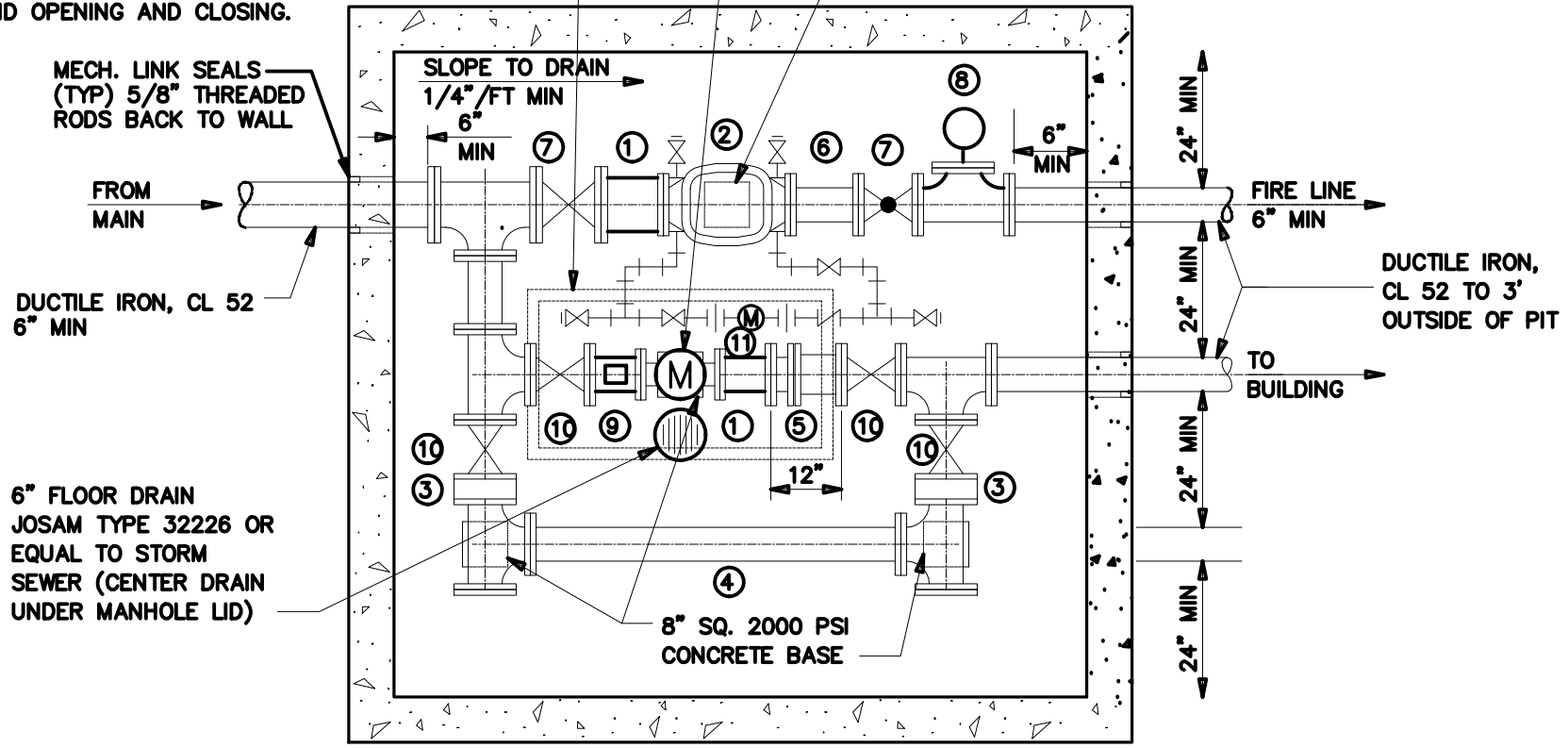
DRAWING NO. W4.4.0

NO SCALE

LID TO BE HALLIDAY PRODUCTS MODEL NO. S1R024048 ALUMINUM WITH RECESSED LIFT HANDLES, S.S. HARDWARE, S.S & ALUMINUM HOLD OPEN ARM, AND S.S. SLAM LOCK WITH KEY OR APPROVED EQUAL. CENTER LID LENGTHWISE OVER DOMESTIC METER. METER TRANSMITTER UNITS TO BE INSTALLED THROUGH LID IN A LOCATION THAT ALLOWS FOR PROPER LID OPENING AND CLOSING.

NOTE:

SEE CCWRD STANDARD DWGS W4.5 & W4.6 FOR WATER SYSTEM CHAMBER DETAILS



① FLANGED SPOOL OR SPACER

② DETECTOR CHECK VALVE ASSEMBLY. SEE CCWRD STD. DWG. W3.1

③ FILLER FLANGE OR SPOOL PIECE AS REQUIRED

④ BY–PASS LINE TO BE SAME SIZE AS DOMESTIC LINE

⑤ FLANGED ADAPTER EQUAL TO DRESSER STYLE 128 WITH 2" NPT TAP & PLUG (TEST PORT)

⑥ FLANGED SPOOL 12" x LENGTH

⑦ FLANGED INDICATOR GATE VALVE W/ HANDWHEEL OR POST INDICATOR VALE, AS REQUIRED BY FIRE DEPARTMENT ELECTRONIC SUPERVISION OF VALVE AS REQUIRED

⑧ FIRE DEPARTMENT CONNECTION.

⑨ FLANGED STRAINER

⑩ FLANGED GATE VALVE W/ HANDWHEEL

⑪ LEAK DETECTOR – SENSUS 1" ACCUSTREM WATER METER WITH TRANSMITTER UNIT, PURCHASED FROM THE COUNTY.

VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

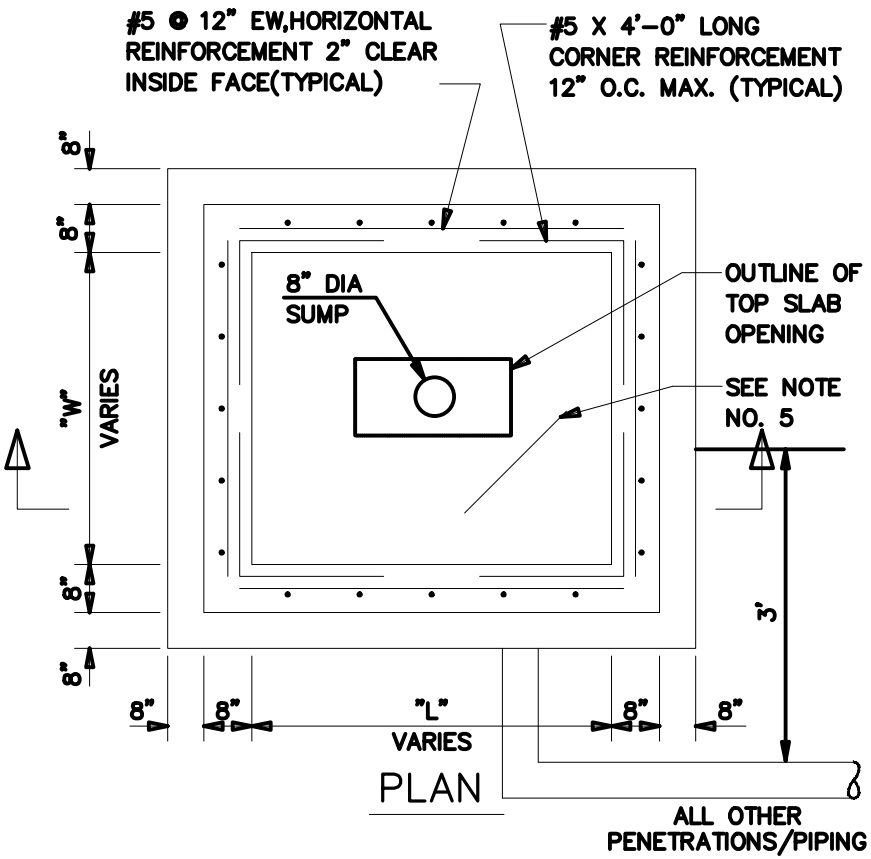
APPROVED _____

DATE _____

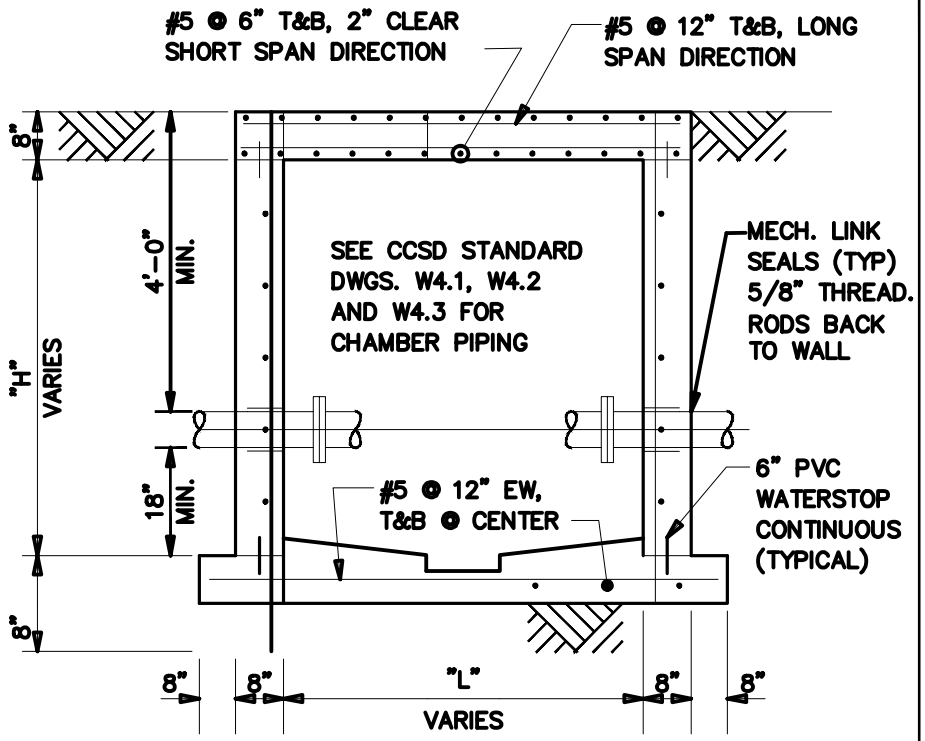
STANDARD
WATER SYSTEM
CHAMBER

DRAWING NO. W4.5.0

NO SCALE



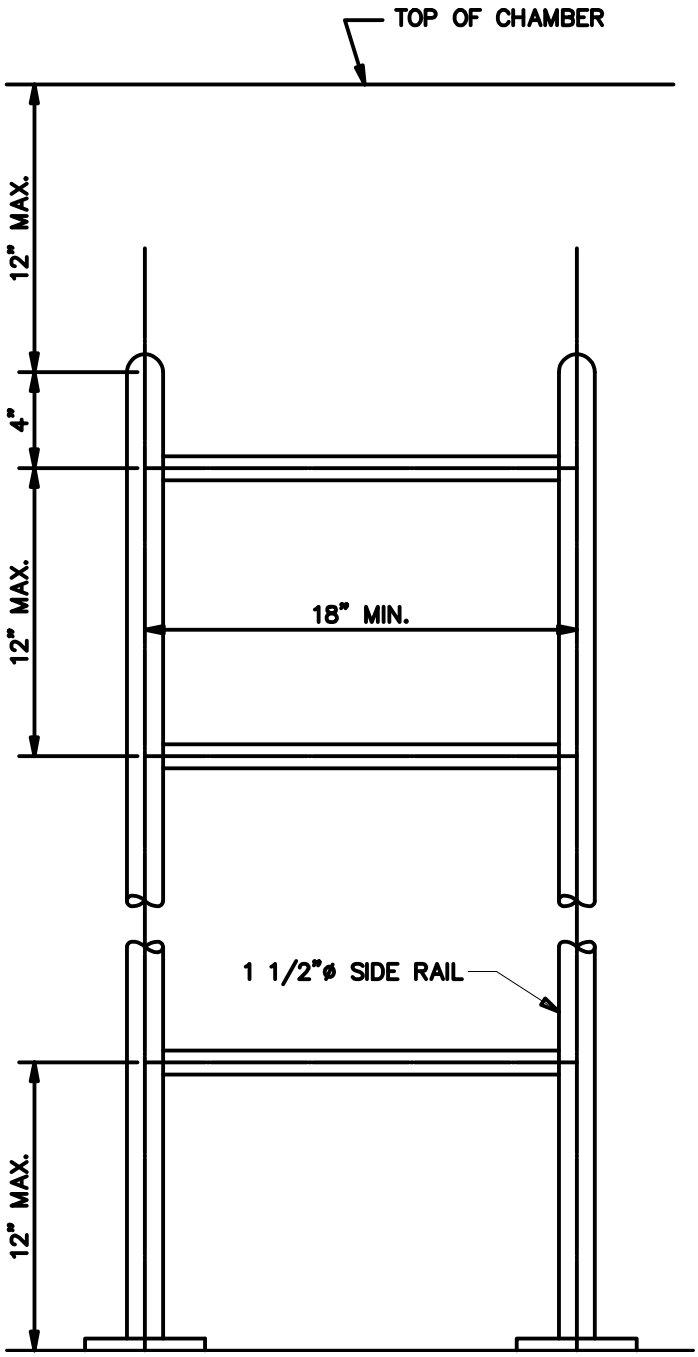
PLAN

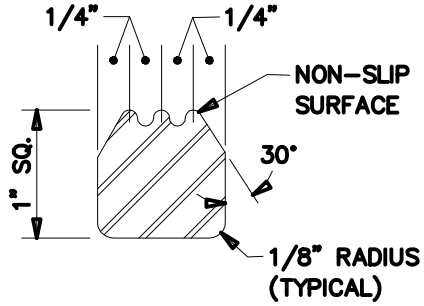


SECTION

NOTES:

1. IF A STORM SEWER IS UNAVAILABLE FOR THE 6" PVC SDR 23.5 CHAMBER DRAIN CONNECTION, AN 8 INCH DIAMETER SUMP SHALL BE PROVIDED. SUMP SHALL BE CAST MONOLITHICALLY WITH BASE SLAB. SUMP PUMPS MAY BE CONSIDERED ONLY FOR FIRE SUPPRESSION VAULTS WITH ELECTRONIC MONITORING ONLY IF POSITIVE DRAINAGE CANNOT BE PROVIDED. ELECTRIC CIRCUIT MUST BE GFCI PROTECTED & INSTALLED IN ACCORDANCE TO NATIONAL ELECTRIC CODE. FROM MINIMUM HORIZONTAL CLEARANCE OF 3 FEET.
2. 6" FLOOR DRAIN SHALL BE JOSAM TYPE 32226 OR EQUAL. DRAIN SHALL BE CENTERED UNDER MANHOLE LID.
3. FOR MINIMUM CHAMBER DIMENSIONS: "L", "W", "H" AND LID PLACEMENT & SIZING, SEE CCWRD STANDARD DWGS. W4.1, W4.2 AND W4.3.
4. SEE CCWRD STANDARD DWG. W4.6 FOR CHAMBER ACCESS LADDER.
5. ADDITIONAL REINFORCEMENT SHALL BE PROVIDED AT EACH CORNER OF EVERY TOP SLAB OPENING–#5 X 2'–0" LONG T&B MINIMUM.
6. REINFORCEMENT SHOWN IS MINIMUM REQUIRED. TOP AND BASE SLABS SHALL BE DESIGNED FOR A UNIFORM LOADING OF 300 PSF LIVE LOAD, WALLS SHALL BE DESIGNED FOR A UNIFORM VARYING LOAD OF 80 PCF PER FOOT FOOT OF DEPTH, WITH A SAFETY OF 1.7 MIN.
7. CHAMBERS SHALL BE CAST–IN–PLACE OR PRECAST CONCRETE (4000 PSI)
8. ALL OTHER PENETRATIONS SHALL BE NO MORE THAN 18" BELOW SURFACE





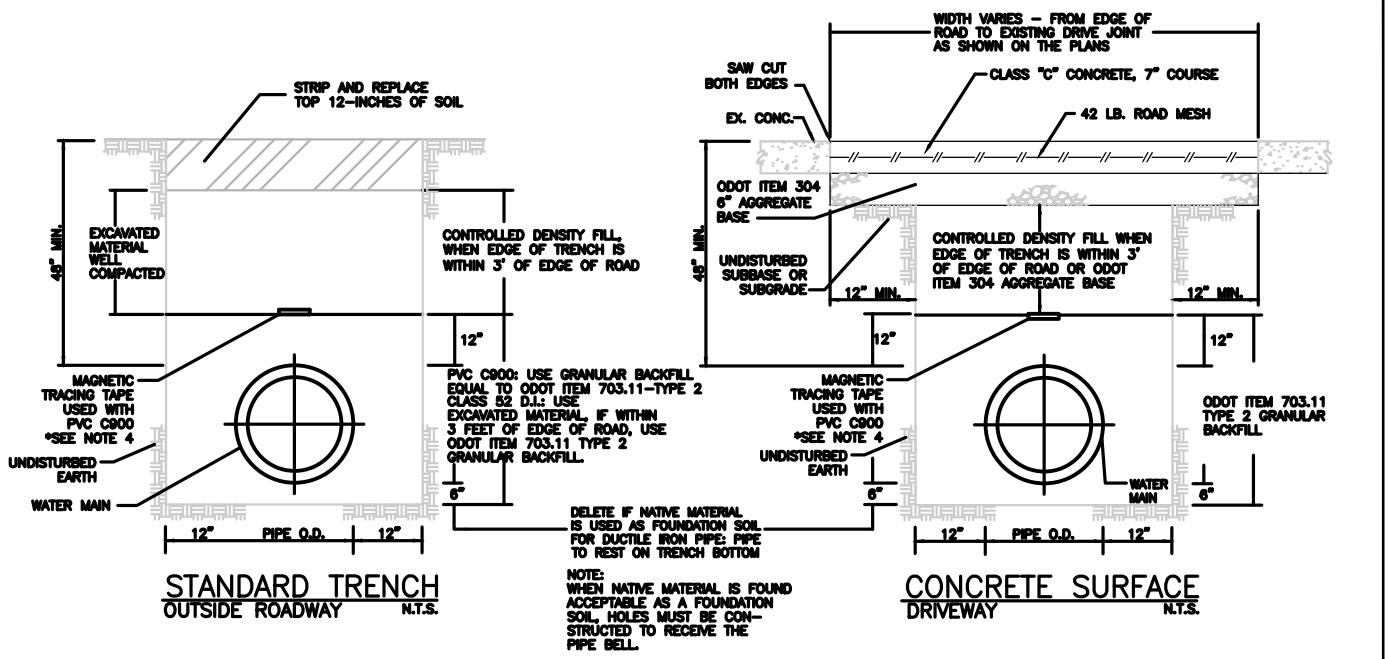
RUNG DETAIL

NOTES:

1. LADDERS SHALL BE FABRICATED FROM ALUMINUM TUBING, PLATES & BARS CONFORMING TO ALLOY & TEMPER 6061-T6.
2. TUBING SHALL HAVE A 1/8" MIN. WALL THICKNESS.
1. LADDER MUST BE FASTENED TO WALL AND FLOOR WITH STAINLESS STEEL ANCHORS.

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	CHAMBER ACCESS LADDER	DRAWING NO. W4.6.0
APPROVED _____ DATE _____		

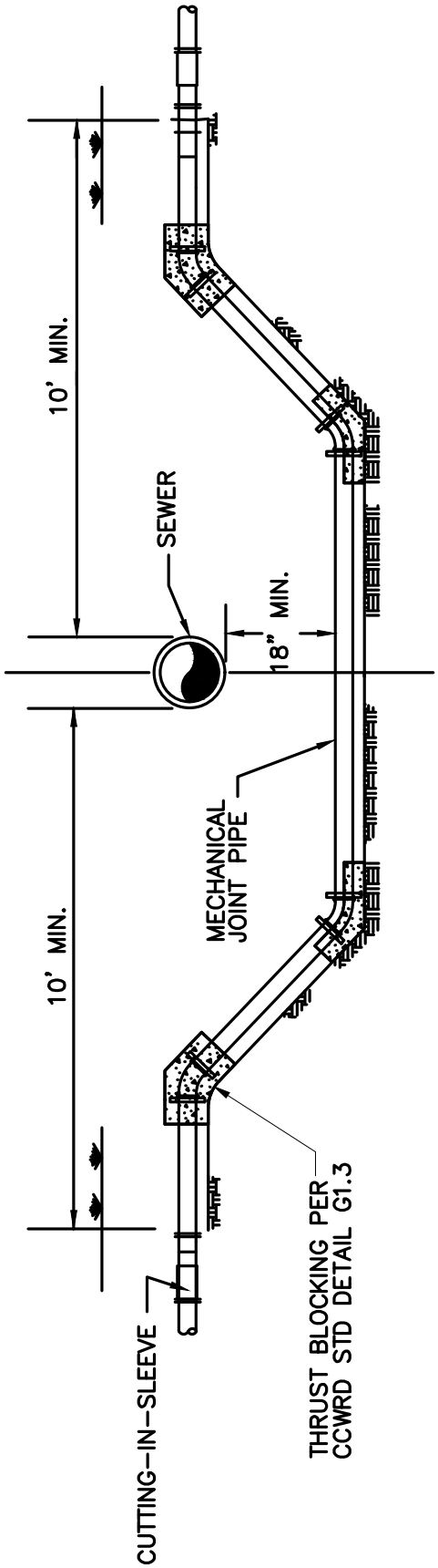


NOTES:

1. "PAVEMENT" AS USED IN THIS DETAIL SHALL ALSO MEAN SIDEWALKS, CURBS, SLABS & OTHER GRADED STRUCTURES.
2. ALL BACKFILL & BEDDING IS TO BE COMPACTED AS CALLED FOR IN THE SPECIFICATIONS.
3. BEDDING AND BACKFILL MATERIALS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION FOR THE SPECIFIC PIPE MATERIAL BEING INSTALLED.
4. IN ADDITION TO MAGNETIC TRACER TAPE, ALL PVC WATER MAIN SHALL INCLUDE A TRACER WIRE SYSTEM INSTALLED IN ACCORDANCE WITH SECTION 2120 OF THE CCWRD STANDARD SPECIFICATIONS
5. 6' LONG CLAY BULKHEADS TO BE INSTALLED AROUND PIPE EVERY 100' IN ACCORDANCE WITH SECTION 1200 OF THE CCWRD SPECIFICATIONS.

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	WATER MAIN TRENCH SECTION	DRAWING NO. W5.1.0
APPROVED _____ DATE _____		



NOTE
DUCTILE IRON RETAINER GLANDS SHALL BE USED ON ALL FITTINGS AND PIPE.

NOT TO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	WATER MAIN LOWERING DETAIL	DRAWING NO. W5.2.0
APPROVED _____ DATE _____		

GENERAL NOTES

GENERAL
ALL WORK AND MATERIALS SHALL CONFORM TO THE LATEST RULES AND REGULATIONS OF THE CLERMONT COUNTY WATER RESOURCES DEPARTMENT FOUND AT WRD.CLERMONTCOUNTYOHIO.GOV. IT IS THE INTENT OF THESE CONSTRUCTION DRAWINGS AND SPECIFICATIONS TO DESCRIBE A COMPLETE FUNCTIONING SYSTEM IN ALL RESPECTS, WHETHER OR NOT EVERY SUB-ELEMENT OF THE TOTAL SYSTEM IS ACTUALLY DEFINED IN WRITING AND/OR DETAIL. PAYMENT TO THE CONTRACTOR(S) SHALL BE INFERRED TO COVER WORK AND MATERIALS REQUIRED FOR A COMPLETE FUNCTIONING SYSTEM SUCH THAT WHEN FINAL PAYMENT IS MADE, THE SYSTEM IS COMPLETELY OPERABLE AND FUNCTIONS IN ALL RESPECTS AS REQUIRED BY THE CONTRACT DOCUMENTS.

THE WORK TO BE PERFORMED UNDER THESE SPECIFICATIONS INCLUDES FURNISHING ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY TO COMPLETE THE WORK CALLED FOR IN THE CONTRACT DOCUMENTS.

THE CONTRACTOR SHALL PROVIDE ALL NECESSARY ELECTRIC, WATER, SANITARY FACILITIES AND WASTE DISPOSAL TO COMPLETE THE WORK.

A SITE VISIT IS HIGHLY RECOMMENDED PRIOR TO SUBMISSION OF BID.

THE EXISTING UTILITIES ARE SHOWN BASED ON FIELD SURVEYS AND THE BEST AVAILABLE INFORMATION. THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO THE START OF WORK.

EXISTING WASTEWATER FLOWS MUST BE MAINTAINED DURING CONSTRUCTION. ADEQUATE SIZING OF THE TEMPORARY PUMPS REQUIRED TO CONVEY THE EXISTING FLOW IS THE RESPONSIBILITY OF THE CONTRACTOR. ANY TEMPORARY PUMPING REQUIRED FOR SATISFACTORY CONSTRUCTION OF THIS PROJECT SHALL COME AT NO ADDITIONAL EXPENSE TO THE OWNER. BYPASS PUMPING MAY BE REQUIRED.

CONTRACTOR IS RESPONSIBLE TO PROVIDE SUPPORT TO THE EXISTING UTILITY POLES, AS NECESSARY TO COMPLETE THE WORK CALLED FOR IN THE CONTRACT DRAWINGS AND SPECIFICATIONS

PAVEMENT
ALL PAVEMENT AND/ROADWAY SURFACE DISTURBED BY THE CONTRACTOR SHALL BE RESTORED BY THE CONTRACTOR AT HIS EXPENSE AND IN CONFORMANCE WITH THE REGULATIONS OF THE GOVERNING AUTHORITY OF SAID ROADWAYS. IN THE ABSENCE OF SUCH REGULATIONS, THE RESTORATION SHALL BE IN ACCORDANCE WITH INSTRUCTIONS BY THE OWNER'S REPRESENTATIVE WITH THE OBJECTIVE OF RESTORING THE PAVING OR ROADWAY SURFACE TO ITS ORIGINAL CONDITION.

RESTORATION
ALL RESTORATION IS THE RESPONSIBILITY OF THE CONTRACTOR. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE TO VIDEO TAPE AND PHOTOGRAPH ALL AREAS THAT WILL BE DISTURBED AS A RESULT OF HIS CONSTRUCTION ACTIVITIES AND WILL DELIVER TO THE OWNER'S REPRESENTATIVE A COPY OF THE VIDEO TAPE AND PHOTOGRAPHS. ALL PICTURES SHALL BE LABELED WITH THE LOCATION WHERE THEY WERE TAKEN. NONCOMPLIANCE MAY RESULT IN THE CONTRACTOR'S LIABILITY FOR ALL DISPUTED PROPERTY RESTORATIONS.

EROSION CONTROL
THE CONTRACTOR SHALL INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES AS NECESSARY TO COMPLETE THE WORK AS OUTLINED IN THESE DRAWINGS AND PROJECT SPECIFICATIONS TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE CLERMONT COUNTY WATER MANAGEMENT AND SEDIMENT CONTROL REGULATIONS AND TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE

UTILITIES
THE EXISTENCE, LOCATION, AND CONDITION OF UTILITIES AND STRUCTURES, BOTH ABOVE AND BELOW GROUND, SHALL BE INVESTIGATED AND VERIFIED IN THE FIELD BY THE CONTRACTOR BEFORE STARTING WORK. EXCAVATION IN THE VICINITY OF SUCH UTILITIES AND STRUCTURES SHALL BE DONE CAREFULLY AND BY HAND IF NECESSARY. THE CONTRACTOR SHALL PROTECT ALL SUCH UTILITIES AND STRUCTURES, BOTH MARKED AND UNMARKED, AND BE HELD RESPONSIBLE FOR DAMAGE TO THEM. THIS INCLUDES ALL EXISTING AND PROPOSED SPRINKLER AND ELECTRIC LINES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ISOLATE, BRACE, SUPPORT, SHEET, ETC. AND PROTECT THE EXISTING UTILITIES FROM MOVING EITHER HORIZONTALLY OR VERTICALLY. IF SUCH MOVEMENT DOES OCCUR DUE TO THE CONTRACTOR'S OPERATIONS, HE SHALL REPAIR THE UTILITY TO THE SATISFACTION OF THE UTILITY OWNER AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL GIVE WRITTEN NOTICE TO ALL OWNERS OF ADJACENT UTILITIES, FIXTURES, AND/OR PROPERTY, OF HIS IMPENDING OPERATIONS, BUT IN NO WAY APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS IN ADVANCE OF EXCAVATION IN THE VICINITY OF SAID UTILITY. FIELD LOCATION SHALL BE MADE BY THE UTILITY OR ITS AUTHORIZED AGENCY BEFORE ANY WORK IS PERFORMED BY THE CONTRACTOR. IF AT ANY TIME DURING WORK, AN EXISTING UTILITY IS DAMAGED IN ANY WAY, THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE APPROPRIATE GOVERNING ENTITY AND THE OWNER'S REPRESENTATIVE.

CONTRACTOR TO REMOVE, REPLACE, AND PROVIDE TEMPORARIES OF ALL STREET SIGNS, MAILBOXES, ETC. AS NEEDED FOR CONSTRUCTION OF THE PROJECT

PVC GRAVITY SEWER MAIN
ALL PVC GRAVITY SEWER MAIN THROUGH 15" DIAMETER SHALL CONFORM TO ASTM D-3034. ALL PVC GRAVITY SEWER MAIN 18" DIAMETER AND LARGER SHALL CONFORM TO ASTM F-679, TYPE I. ELASTOMERIC GASKET JOINTS FOR BOTH TYPES OF PVC GRAVITY SEWER MAIN SHALL CONFORM TO ASTM D-3212. MATERIAL FOR PVC GRAVITY SEWER MAIN SHALL CONFORM TO THE REQUIREMENTS OF ASTM D-1784 FOR CELL CLASSIFICATION 12364 OR 12454. PVC GRAVITY SEWER MAIN PIPE SHALL ALSO CONFORM TO THE FOLLOWING SCHEDULE:

DEPTH OF COVER (FROM TOP OF PIPE)	SDR SCHEDULE
<15' OF COVER	35
15' UP TO <28' OF COVER	26
28' AND OVER OF COVER	17

ALL PVC GRAVITY SEWER MAIN SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321.

PIPE INSTALLATION
THE PROPOSED LOCATION OF THE GRAVITY SEWER MAIN IS SHOWN ON THE PLANS. CONSTRUCTION SHALL BEGIN AT THE FURTHEST DOWNSTREAM POINT OF THE PROJECT, UNLESS APPROVED OTHERWISE BY THE OWNER'S REPRESENTATIVE. A WATER-TIGHT BULKHEAD MUST BE INSTALLED AT THE FURTHEST DOWNSTREAM MANHOLE TO SEPARATE THE NEW WORK FROM THE EXISTING SEWER SYSTEM. AT THE SUCCESSFUL CONCLUSION OF TESTING, THE CONTRACTOR MUST REMOVE THE BULKHEAD.

INFILTRATION AND EXFILTRATION TESTING FOR GRAVITY SEWER PIPE
THE OWNER'S REPRESENTATIVE MAY ORDER THE CONTRACTOR TO MAKE INFILTRATION (LEAKAGE) TESTS OF AS MANY SECTIONS OF THE SANITARY SEWERS AND ITS LATERALS, AS, IN THE OWNER'S REPRESENTATIVE OPINION, MAY BE NECESSARY TO DETERMINE WHETHER WORK COMPLIES WITH THE ABOVE REQUIRED RATE OF INFILTRATION. GENERALLY, A SECTION OF SEWER SHALL MEAN THE DISTANCE BETWEEN MANHOLES. SUCH TESTS WILL BE OF 30 MINUTE MINIMUM DURATION AND WILL ONLY BE MADE AT THE TIME OF MAXIMUM HEIGHT OF GROUND WATER, PROVIDED THAT SUCH MAXIMUM HEIGHT OF GROUND WATER MUST BE AT LEAST TWO (2) FEET ABOVE THE ELEVATION OF THE OUTSIDE TOP OF THE SEWER AT THE UPSTREAM LIMIT OF THE SECTION BEING TESTED. THE INFILTRATION TEST SHALL BE MADE BY INSTALLING A WEIR OR OTHER MEASURING DEVICE APPROVED BY THE OWNER'S REPRESENTATIVE IN THE LOWER END OF THE SEWER SECTION TO BE TESTED. THE QUANTITY OF GROUND WATER INFILTRATION INTO THE SEWER WILL BE MEASURED AND SHALL NOT EXCEED THE ALLOWABLE LEAKAGE.

THE WATER RESOURCES DEPARTMENT MAY ALSO ORDER EXFILTRATION TESTS TO BE MADE. FOR EXFILTRATION TESTS, THE CONTRACTOR SHALL FILL THE SEWER WITH WATER TO AN ELEVATION OF TWO (2) FEET ABOVE THE OUTSIDE TOP OF THE SEWER AT THE UPSTREAM LIMIT OF THE SECTION BEING TESTED. THE EXFILTRATION SHALL NOT EXCEED THE RATE OF 100 GALLONS PER INCH OF TRIBUTARY PIPE DIAMETER, PER 24 HOURS PER MILE OF LENGTH, AS SPECIFIED FOR INFILTRATION.

THE CONTRACTOR SHALL ALSO PERFORM A DEFLECTION TEST IN ALL SECTIONS OF GRAVITY SEWER PIPE. THE TEST SHALL BE CONDUCTED AFTER THE FINAL BACKFILL HAS BEEN IN PLACE AT LEAST 30 DAYS. PRIOR TO MAKING THE DEFLECTION TESTS, THE LINES SHALL BE FLUSHED AND SWABBED. SWABBING SHALL BE BY AN INFLATED RUBBER BALL OR OTHER APPROVED METHOD. THE DEFLECTION OF ANY SEWER PIPE SHALL NOT EXCEED 5 PERCENT. THE DEFLECTION TEST SHALL BE MADE BY USING A RIGID BALL OR MANDREL AND SHALL HAVE A DIAMETER EQUAL TO 95 PERCENT OF THE INSIDE DIAMETER OF THE PIPE. ALL TESTING SHALL BE CONDUCTED UNDER THE SUPERVISION OF THE OWNER'S REPRESENTATIVE. THE TEST SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES. CORRECTION OF ANY SECTION OF SEWER PIPE NOT MEETING THE DEFLECTION TEST SHALL BE APPROVED BY THE OWNER'S REPRESENTATIVE.

PVC GRAVITY SEWER MAIN PIPE TESTING
AN APPROVED TYPE OF LOW PRESSURE AIR TEST MAY BE USED IN LIEU OF THE ABOVE EXFILTRATION TESTS AT THE OPTION OF THE OWNER'S REPRESENTATIVE. UNLESS OTHERWISE DIRECTED BY THE OWNER'S REPRESENTATIVE, THE SEWER WILL BE TESTED AT 5 POUNDS OF PRESSURE FOR 5 MINUTES WITH NO LOSS OF PRESSURE.

GRAVITY SEWER LATERALS
LATERALS SHALL BE CONSTRUCTED WITH A 6 INCH MINIMUM DIAMETER. THEY SHALL BE CONSTRUCTED AT THE SAME STANDARD DIMENSION RATIO (SDR) AS THE SEWER MAIN IT IS BEING CONNECTED TO. IF THE SEWER MAIN IS NOT PVC, THE LATERAL SHALL BE PVC WITH A STANDARD DIMENSION RATIO CORRESPONDING TO THE SCHEDULE ESTABLISHED IN SECTION 3110 PVC GRAVITY SEWER MAIN.

LOCATION OF MANHOLE(S)
MANHOLES SHALL BE INSTALLED AT POINTS OF CHANGE IN SEWER GRADE, SIZE, OR DIRECTION, AT JUNCTIONS, AT INTERMEDIATE POINTS AND AT THE END OF EACH LINE. MANHOLES FOR SEWERS 36 INCHES AND LARGER IN DIAMETER SHALL BE LOCATED NEAR POINTS OF CHANGE IN SEWER GRADE, SIZE OR DIRECTION IN ORDER THAT STANDARD COMPONENTS MAY BE USED. MANHOLES SHALL BE INSTALLED AT MAXIMUM INTERVALS OF 400 FEET FOR SEWERS 15 INCHES IN DIAMETER AND SMALLER, AND 500 FEET FOR SEWERS 18 INCHES TO 48 INCHES IN DIAMETER.

DROP MANHOLE(S)
DROP MANHOLES SHALL BE USED WHEN THE INVERT OF THE INFLOW SEWER IS TWO FEET OR MORE ABOVE THE MANHOLE INVERT. WHEN THIS DIFFERENCE IN ELEVATION IS LESS THAN TWO FEET, THE MANHOLE INVERT SHALL BE FILLETED TO PREVENT SOLIDS DEPOSITION. DROP MANHOLES SHALL BE CONSTRUCTED WITH INSIDE DROP PIPES AS SHOWN ON THE WATER RESOURCES DEPARTMENT STANDARD DRAWINGS. INSIDE DROP CONNECTIONS, WHEN APPROVED BY THE DEPARTMENT, SHALL BE CONSTRUCTED OF SDR-23.5 PVC SEWER PIPE, SECURELY FASTENED TO THE INSIDE FACE OF THE MANHOLE WITH STAINLESS ANCHORS AND PIPE SUPPORTS. DROP MANHOLES SHALL BE CONSTRUCTED WITH THE RELINER INSIDE DROP SYSTEM OR EQUAL AS DETERMINED BY THE WATER RESOURCES DEPARTMENT.

MATERIALS FOR MANHOLE(S)
PRECAST CONCRETE BASES, RISERS AND TOPS SHALL BE CONSTRUCTED OF REINFORCED CONCRETE AND SHALL CONFORM TO THE REQUIREMENTS OF THE "SPECIFICATIONS FOR CIRCULAR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS", ASTM C-478, EXCEPT AS MODIFIED HEREIN. PIPE CONNECTION TO MANHOLE BASES SHALL BE MADE WITH FLEXIBLE RUBBER COMPRESSION GASKETS CONFORMING TO ASTM C923. PIPE TO MANHOLE CONNECTOR FOR SANITARY SYSTEMS SHALL BE A-LOK X-CEL OR EQUAL AS DETERMINED BY THE WATER RESOURCES DEPARTMENT.
JOINTS BETWEEN PRECAST MANHOLE SECTIONS SHALL BE FLEXIBLE WATERTIGHT RUBBER GASKETS CONFORMING TO ASTM C-443. ADDITIONAL FLEXIBLE BUTYL RUBBER SEALANT EQUAL TO CONSEAL TYPE CS-102 SHALL BE APPLIED TO THE OUTSIDE AND INSIDE HORIZONTAL PORTION OF EACH MANHOLE JOINT. CARE MUST BE EXERCISED TO ENSURE THE JOINTS ARE CLEAN AND FREE OF DIRT, DEBRIS AND GREASE TO ASSURE ADHESION OF THE SEAL MATERIAL.

1-1/4 INCH HOLES FOR HANDLING MAY BE CAST IN THE DOME AND RINGS. THESE HOLES SHALL BE PLUGGED AND SEALED ONCE THE MANHOLE IS IN PLACE.

PRECAST ADJUSTING RINGS SHALL BE REINFORCED WITH ONE (1) NO. 3 GAGE WIRE OR EQUIVALENT. A MAXIMUM OF 12 INCHES IN HEIGHT OF ADJUSTING RINGS SHALL BE ALLOWED FOR EACH MANHOLE. NO MORE THAN TWO (2) ADJUSTING RINGS WILL BE PERMITTED FOR EACH MANHOLE. A FLEXIBLE BUTYL RUBBER SEALANT EQUAL TO CONSEAL TYPE CS-102 SHALL BE USED TO SEAL THE JOINT BETWEEN THE MANHOLE TOP AND FIRST ADJUSTING RING AND EACH SUCCEEDING JOINT BETWEEN SAID RINGS.

COMPOSITE ADJUSTING RINGS SHALL BE INFRA-RISER MULTI-PURPOSE RUBBER COMPOSITE ADJUSTMENT RISER BY EAST JORDAN IRON WORKS OR EQUAL AS DETERMINED BY THE WATER RESOURCES DEPARTMENT.

IN GENERAL, THE MANHOLES SHALL BE CONSTRUCTED SO THE TOP OF THE CASTING IS AT THE ELEVATION OF THE PROPOSED STREET GRADE OR TO A POINT 2 INCHES ABOVE THE PRESENT GROUND SURFACE OR TO A POINT 24 INCHES ABOVE THE GROUND SURFACE OF A CULTIVATED FIELD OR AS ORDERED. THE MANHOLE CASTING SHALL BE SET ON A FLEXIBLE BUTYL RUBBER SEALANT EQUAL TO CONSEAL TYPE CS-102, TO PROVIDE A SEAL BETWEEN THE MANHOLE CASTING AND THE MANHOLE STRUCTURE. SPECIAL CARE SHALL BE EXERCISED TO PREVENT THE ENTRANCE OF EARTH OR DEBRIS INTO MANHOLES AND PIPE LINES. ALL SUCH EARTH AND DEBRIS SHALL BE REMOVED FROM THE MANHOLES AND PIPE LINES DURING CONSTRUCTION OPERATIONS.
PIPE TRENCH OVER-EXCAVATION REQUIRED FOR MANHOLE INSTALLATION SHALL BE BACKFILLED WITH COMPACTED GRANULAR BACKFILL AS SPECIFIED IN THE WATER RESOURCES DEPARTMENT SPECIFICATIONS FOR PIPE BEDDING AND INITIAL BACKFILL.

INSTALLATION OF MANHOLE
MANHOLES SHALL BE WATERTIGHT STRUCTURES CONSTRUCTED IN ACCORDANCE WITH ONE OF THE FOLLOWING METHODS:
1. PRECAST MANHOLE BASES, IN COMBINATION WITH RISER SECTIONS, TRANSITION SECTIONS, CONES AND/OR FLAT SLAB TOPS AS SHOWN ON THE DRAWINGS.
2. MONOLITHIC CONCRETE CAST-IN-PLACE BASES, IN COMBINATION WITH PRECAST RISER SECTIONS, CONES AND/OR FLAT SLAB TOPS.

MANHOLES WITH PRECAST BASE SECTIONS SHALL BE PLACED ON A 6 INCH COMPACTED LAYER OF AGGREGATE BASE #57 STONE.

WHERE SHAPING OF MANHOLE WALLS AND BOTTOMS IS REQUIRED OR ORDERED TO PROVIDE FOR PIPE JUNCTIONS, CHANNELS, ETC.; SUCH WORK SHALL BE MADE WITH CLASS "F" CONCRETE CONFORMING TO THE REQUIREMENTS OF ODOT ITEM 499 AND 511. THE INVERT CHANNEL AND MANHOLE BENCH SHALL BE CONSTRUCTED AS SHOWN IN THE STANDARD DRAWINGS. IN GENERAL, THE INVERT CHANNEL SHALL BE A SMOOTH CONTINUATION OF THE PIPE AND USHAPED. THE BENCH SHALL PROVIDE GOOD FOOTING FOR WORKMEN AND HAVE A 1 INCH BATTER TOWARDS THE INVERT CHANNEL.

TESTING FOR MANHOLE(S)
THE MANHOLES WILL BE TESTED AND INSPECTED FOR DAMAGE PRIOR TO PLACING IN SERVICE, UNDER THE WATER RESOURCES DEPARTMENT SUPERVISION, AFTER INSTALLATION IS COMPLETE TO SHOW THEY ARE WATERTIGHT. THIS SPECIFICATION SHALL GOVERN THE VACUUM TESTING OF SANITARY SEWER MANHOLES AND STRUCTURES AND SHALL BE USED AS A METHOD OF DETERMINING ACCEPTABILITY IN ACCEPTING MAINTENANCE OF A SANITARY SEWER MANHOLE OR STRUCTURE. VACUUM TESTING SHALL BE ACCORDING TO ASTM C1244, EXCEPT AS SPECIFIED OTHERWISE HEREIN. ALL NEW SANITARY SEWER MANHOLES AND STRUCTURES SHALL BE TESTED BY VACUUM TEST AS SPECIFIED HEREIN TO TEST FOR LEAKS. MANHOLES SHALL BE TESTED AFTER INSTALLATION WITH ALL CONNECTIONS IN PLACE. IF A MANHOLE FAILS THE VACUUM TEST, THE MANHOLE SHALL BE REPAIRED WITH MATERIAL APPROVED BY CLERMONT COUNTY. THE VACUUM TEST SHALL THEN BE REPEATED UNTIL A SATISFACTORY TEST IS OBTAINED. ALL TEMPORARY PLUGS AND BRACES SHALL BE REMOVED AFTER EACH TEST.

PROCEDURE FOR TESTING SHALL BE AS FOLLOWS:
1. TEMPORARILY PLUG, WITH THE PLUGS BEING BRACED TO PREVENT THE PLUGS OR PIPES FROM BEING DRAWN INTO THE MANHOLE, ALL PIPES ENTERING THE MANHOLE AT LEAST SIX INCHES INTO THE SEWER PIPE(S). THE PLUG MUST BE INFLATED AT A LOCATION PAST THE MANHOLE/PIPE GASKET.
2. THE TEST HEAD SHALL BE PLACED INSIDE THE FRAME AT THE TOP OF THE MANHOLE AND INFLATED, IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. A VACUUM OF TEN INCHES OF MERCURY (10"HG) SHALL BE DRAWN ON THE MANHOLE. SHUT THE VALVE ON THE VACUUM LINE TO THE MANHOLE AND SHUT OFF THE PUMP OR DISCONNECT THE VACUUM LINE FROM THE PUMP.
4. THE PRESSURE GAUGE SHALL BE LIQUID-FILLED, HAVING A 3.5 INCH DIAMETER FACE WITH A READING FROM ZERO TO THIRTY INCHES OF MERCURY.
5. THE MANHOLE SHALL BE CONSIDERED TO PASS THE VACUUM TEST IF THE TIME FOR THE VACUUM READING TO DROP FROM 10" TO 9" HG MEETS OR EXCEEDS THE VALUES INDICATED IN THE FOLLOWING TABLE:

MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS (MINUTES AND SECONDS)

MH DEPTH (FEET)	4' DIAMETER MH	5' DIAMETER MH	6' DIAMETER MH
15 FEET OR LESS	50 SEC.	1 MIN. & 5 SEC.	1 MIN. & 20 SEC.
15.01 TO 30 FEET	1 MIN. & 20 SEC.	1 MIN. & 45 SEC.	2 MIN. & 10 SEC.

REVISION NO.
ISSUED

GENERAL SANITARY SEWER NOTES

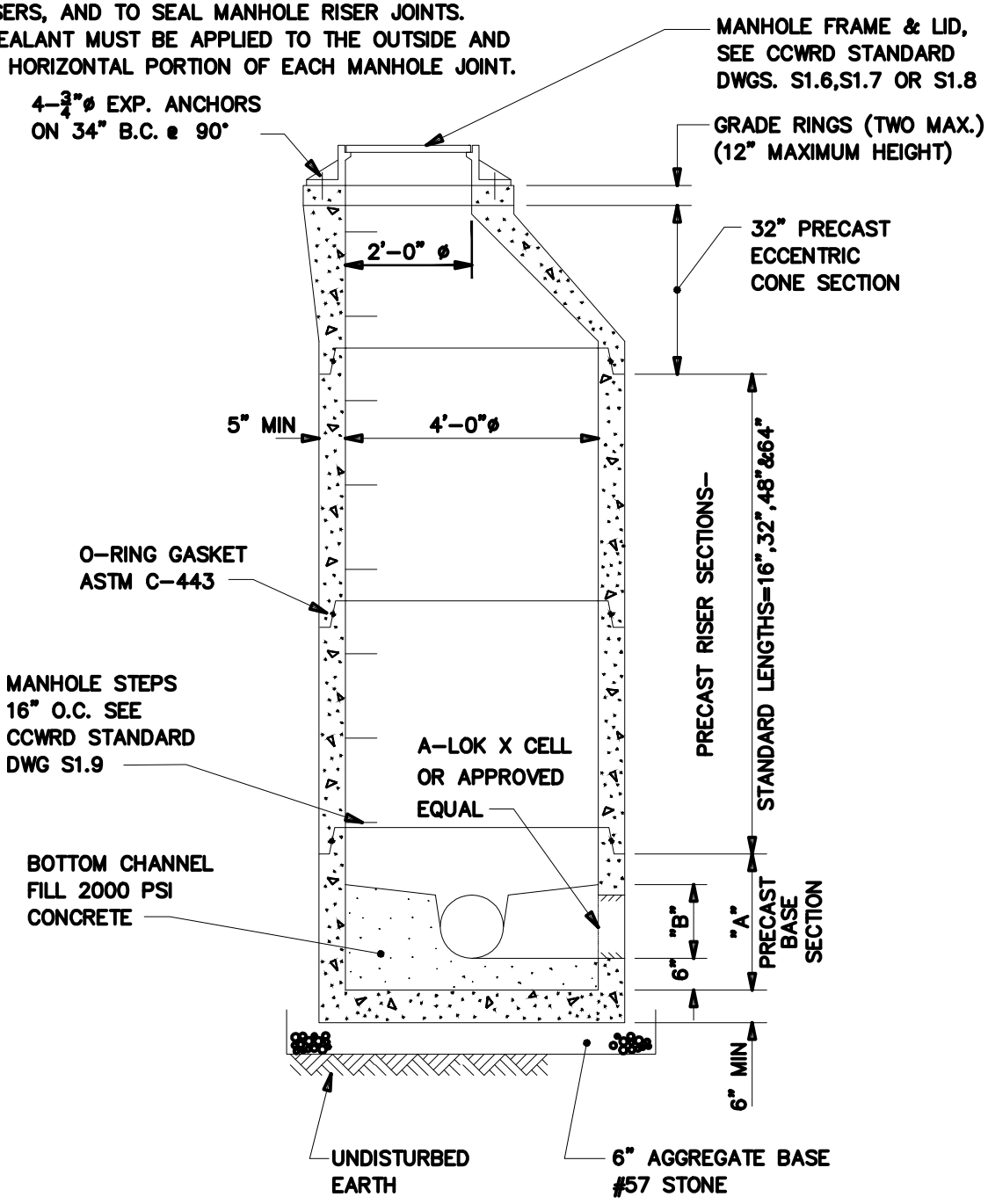
SCALE: N/A

DATE: AUGUST 2024

S1.0.0

NOTE:

FLEXIBLE BUTYL RUBBER SEALANT EQUAL TO CONSEAL TYPE CS-102 SHALL BE USED TO: SEAL CASTING TO MANHOLE, TO SEAL ADJUSTING RINGS TOGETHER AND TO RISERS, AND TO SEAL MANHOLE RISER JOINTS. THE SEALANT MUST BE APPLIED TO THE OUTSIDE AND INSIDE HORIZONTAL PORTION OF EACH MANHOLE JOINT.



"A" DIMENSION	SEWER SIZE
24"	8" & 10"
30"	12" & 15"
38"	18"

"B" DIMENSION	SEWER SIZE
PIPE ID + 2"	8",10"&12"
1/2 PIPE ID + 2"	15" & LARGER

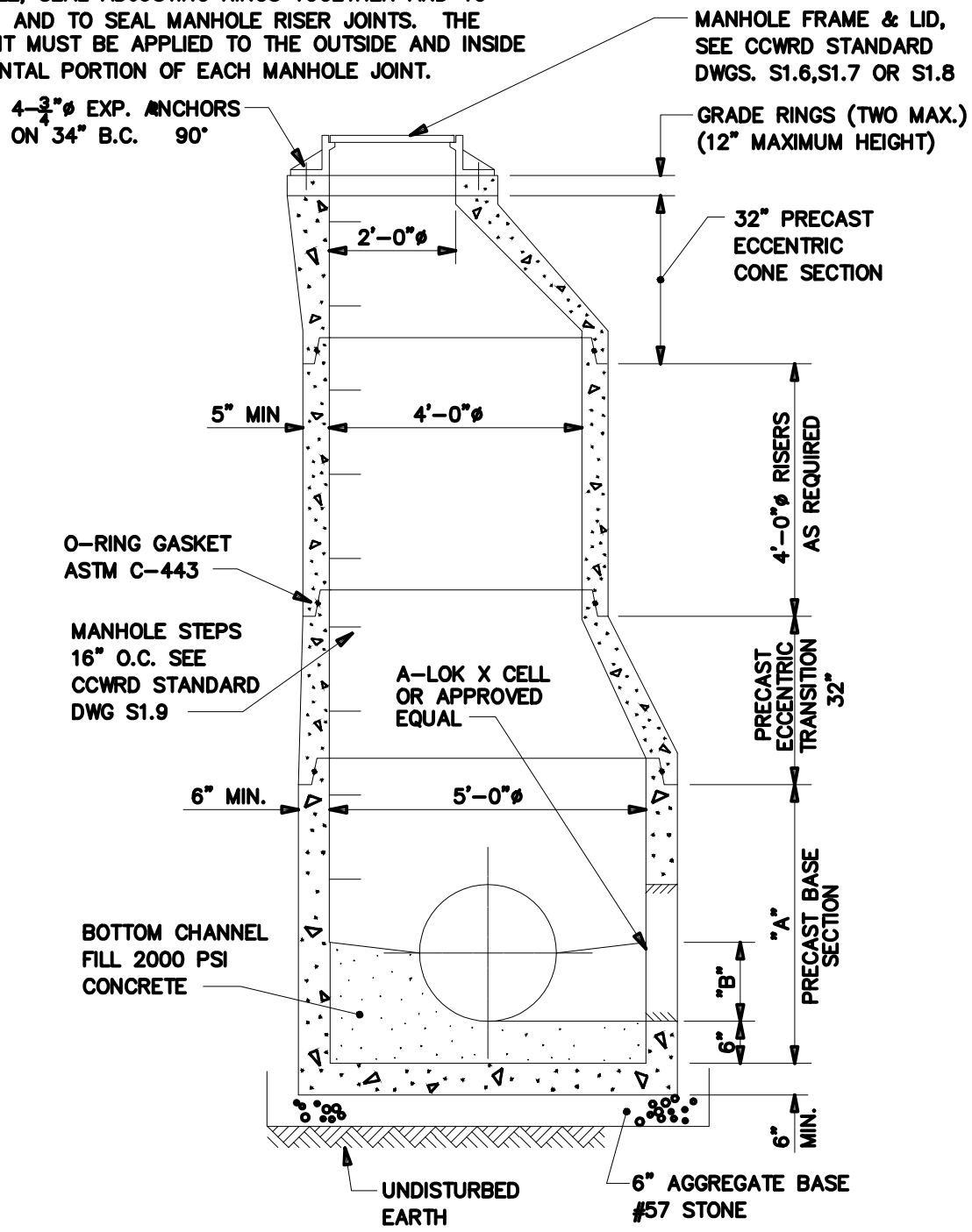
KOR-N-SEAL I OR APPROVED EQUAL FOR CONNECTION TO EXISTING MANHOLES

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT APPROVED _____ DATE _____ REVISED DEC. 2018	STANDARD MANHOLE FOR SEWERS 8" TO 18"	DRAWING NO. S1.1.0

NOTE:

FLEXIBLE BUTYL RUBBER SEALANT EQUAL TO CONSEAL TYPE CS-102 SHALL BE USED TO: SEAL CASTING TO MANHOLE, SEAL ADJUSTING RINGS TOGETHER AND TO RISERS, AND TO SEAL MANHOLE RISER JOINTS. THE SEALANT MUST BE APPLIED TO THE OUTSIDE AND INSIDE HORIZONTAL PORTION OF EACH MANHOLE JOINT.



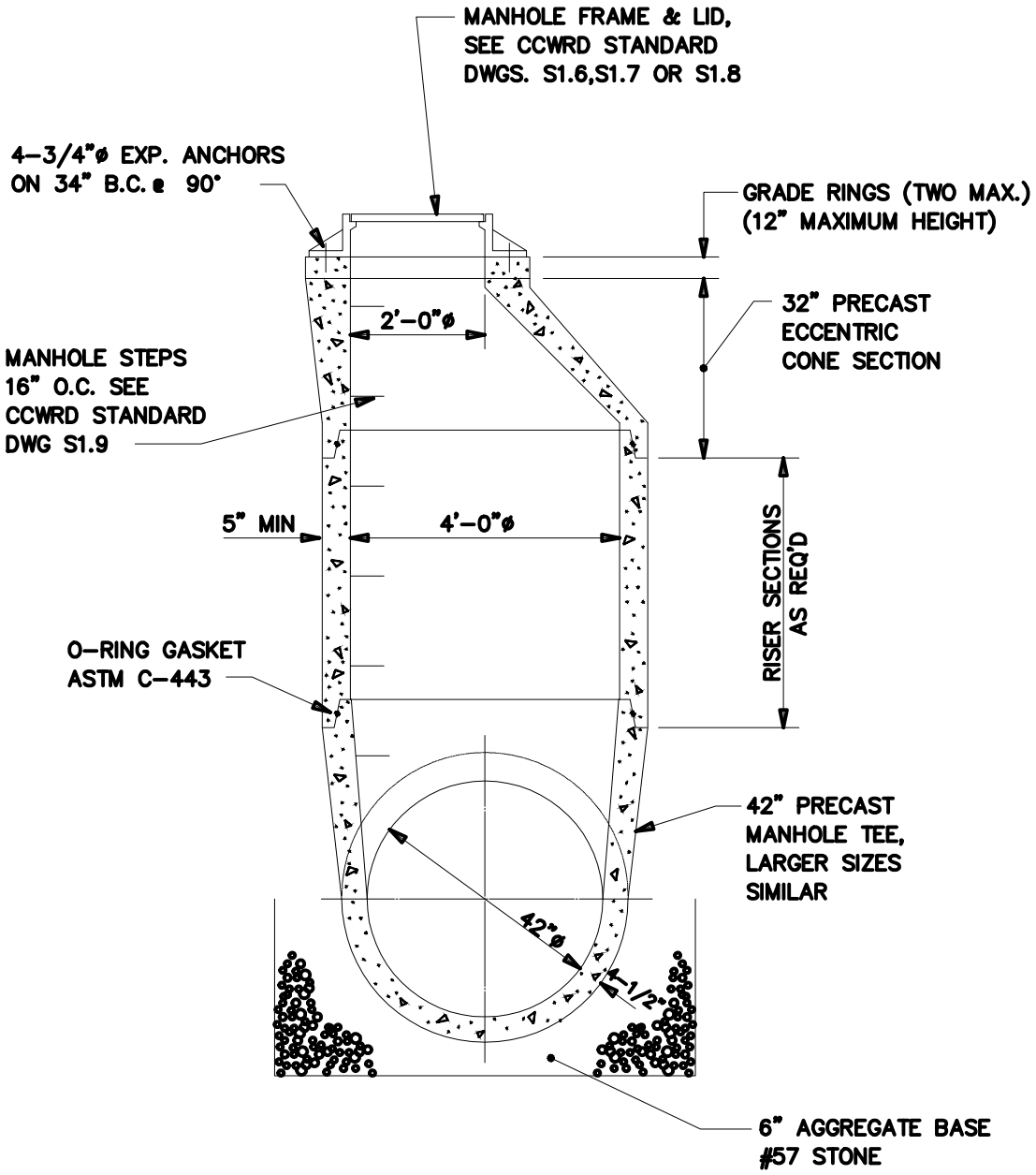
"A" DIMENSION	SEWER SIZE
42"	21" – 27"
58"	30" – 36"

"B" DIMENSION	SEWER SIZE
1/2 PIPE ID + 2"	ALL

KOR-N-SEAL I OR APPROVED EQUAL FOR CONNECTION TO EXISTING MANHOLES

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	STANDARD MANHOLE FOR SEWERS 21" TO 36"	DRAWING NO. S1.2.0
APPROVED _____ DATE _____ REVISED DEC. 2018		



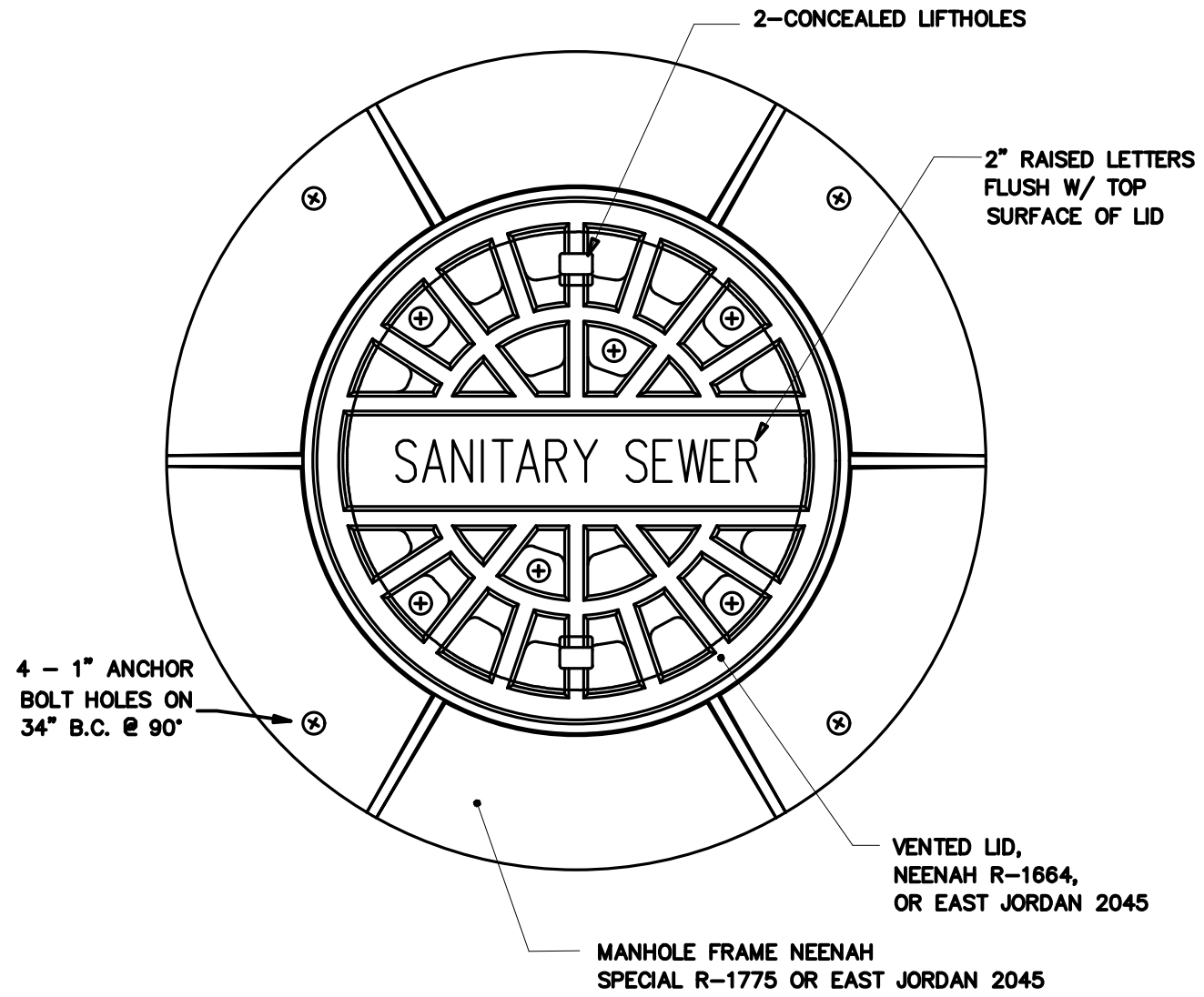
NOTES:

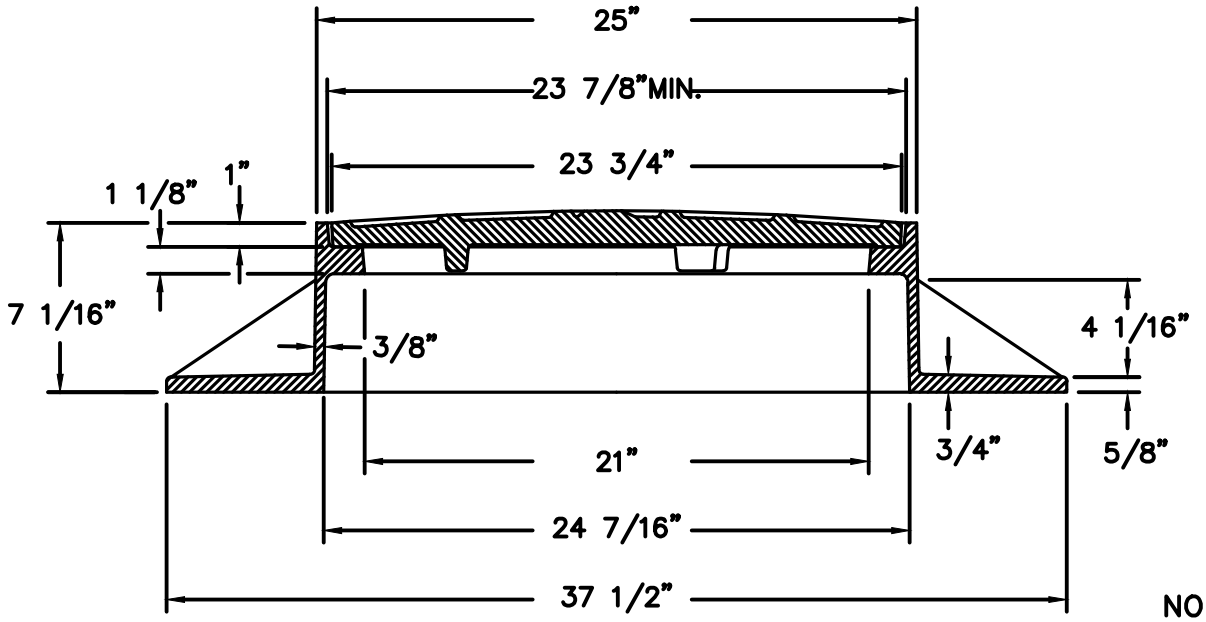
1. MANHOLE RISER SHALL BE CAST MONOLITHICALLY WITH 8" LG. PIPE SECTION.
2. FLEXIBLE BUTYL RUBBER SEALANT EQUAL TO CONSEAL TYPE CS–102 SHALL BE USED TO: SEAL CASTING TO MANHOLE, SEAL ADJUSTING RINGS TOGETHER AND TO RISERS, AND TO SEAL MANHOLE RISER JOINTS. THE SEALANT MUST BE APPLIED TO THE OUTSIDE AND INSIDE HORIZONTAL PORTION OF EACH MANHOLE JOINT.

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	STANDARD MANHOLE FOR SEWERS 42" & LARGER	DRAWING NO. S1.3.0
APPROVED _____ DATE _____		

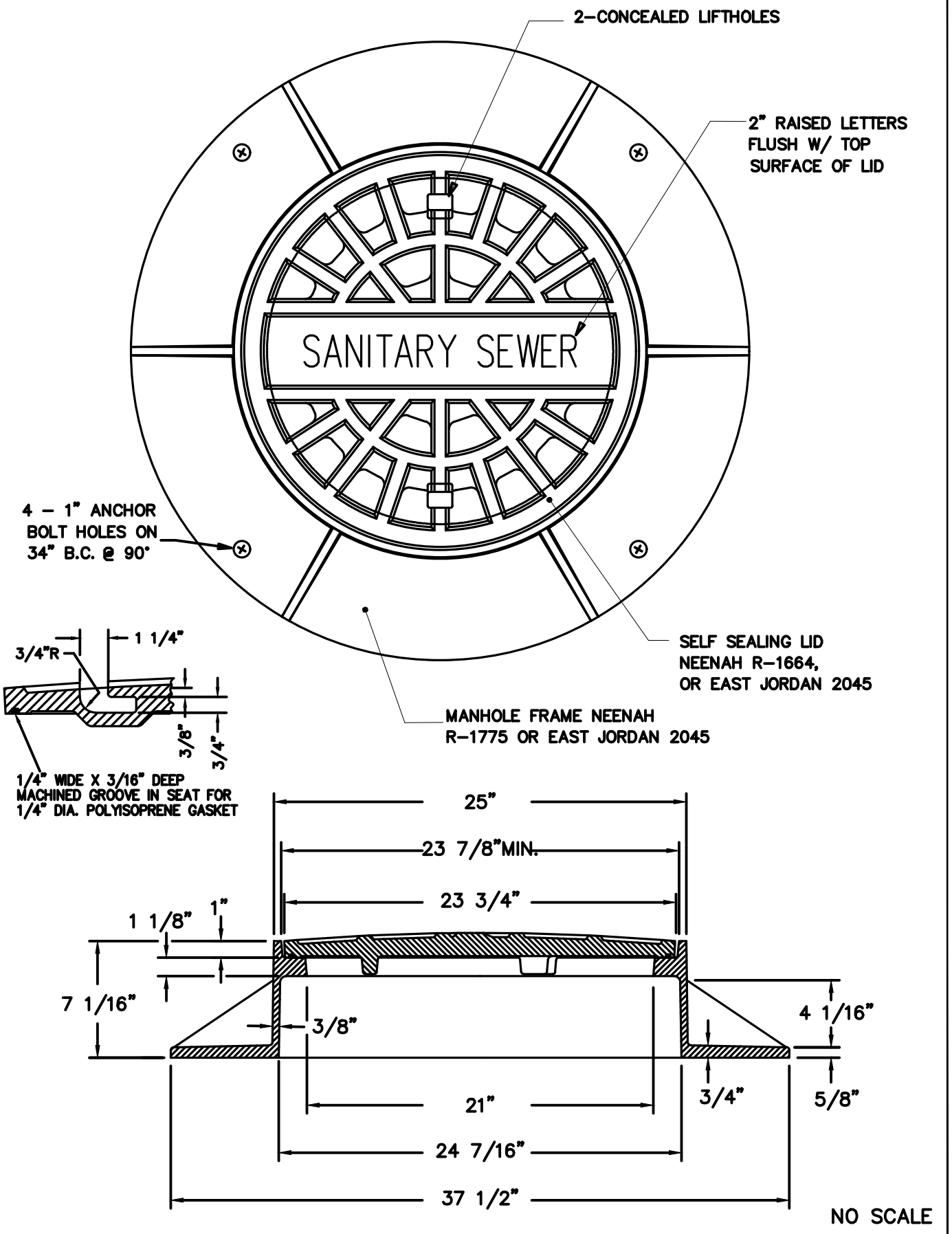
REVISED DEC. 2018





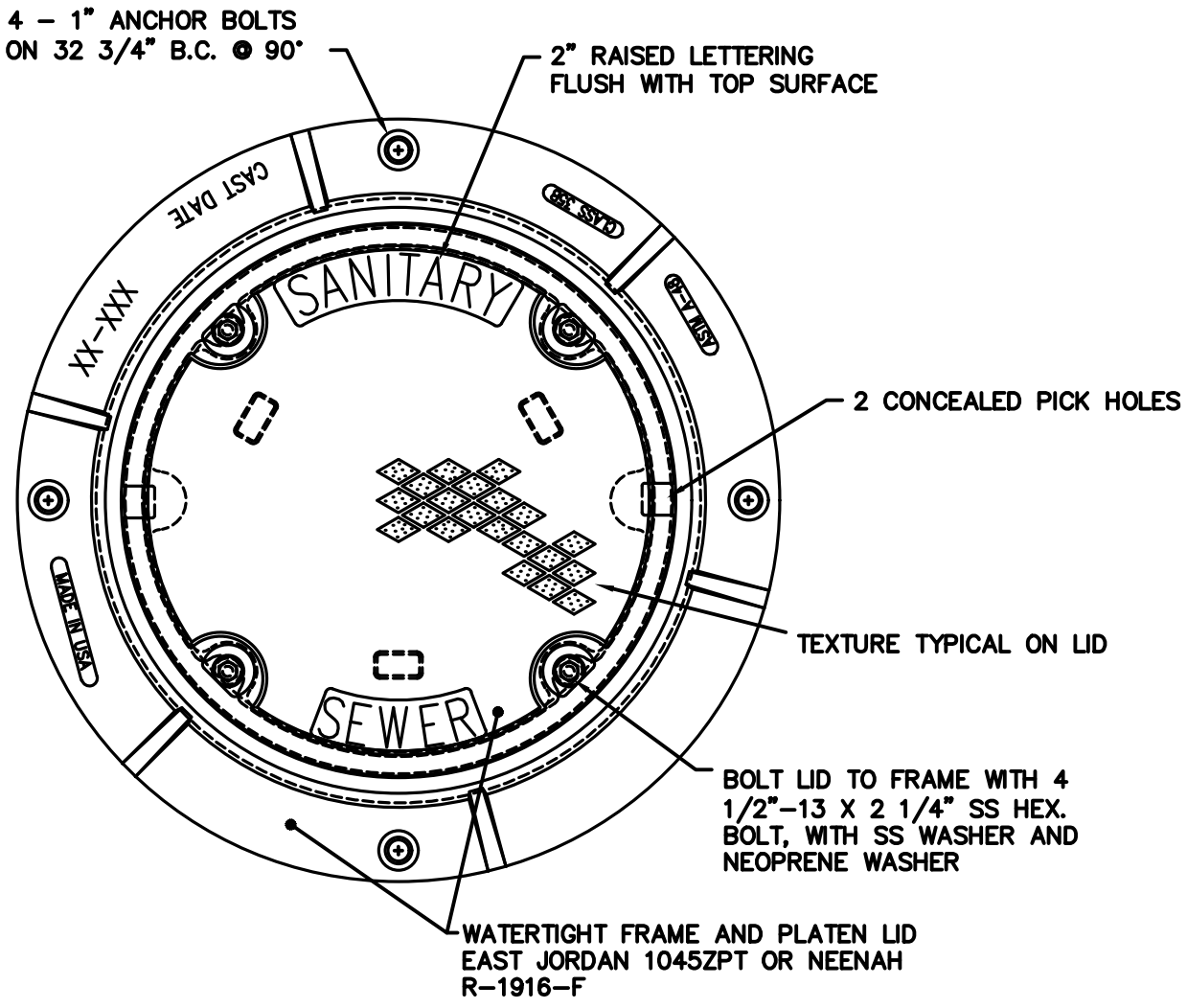
NO SCALE

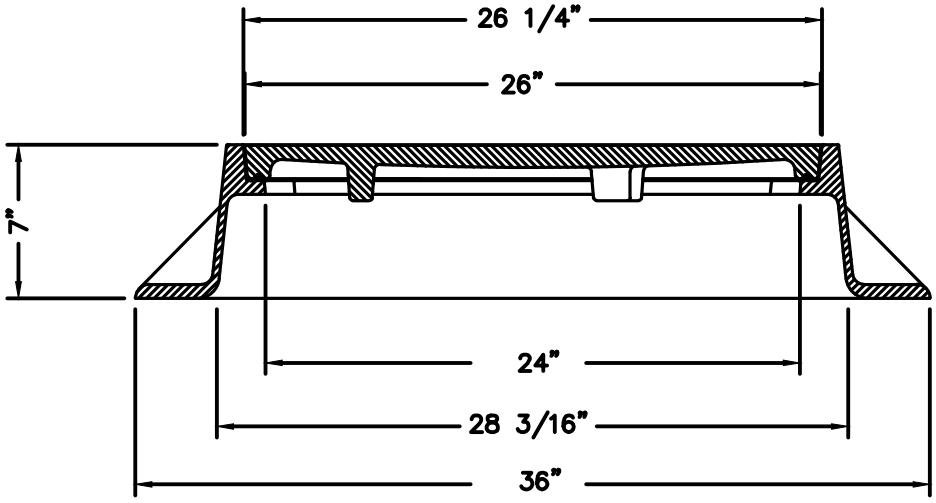
VILLAGE OF MT. ORAB UTILITY DEPARTMENT	MANHOLE FRAME WITH VENTED LID	DRAWING NO. S1.6.0
APPROVED _____ DATE _____ REVISED JUNE 2013		



NO SCALE

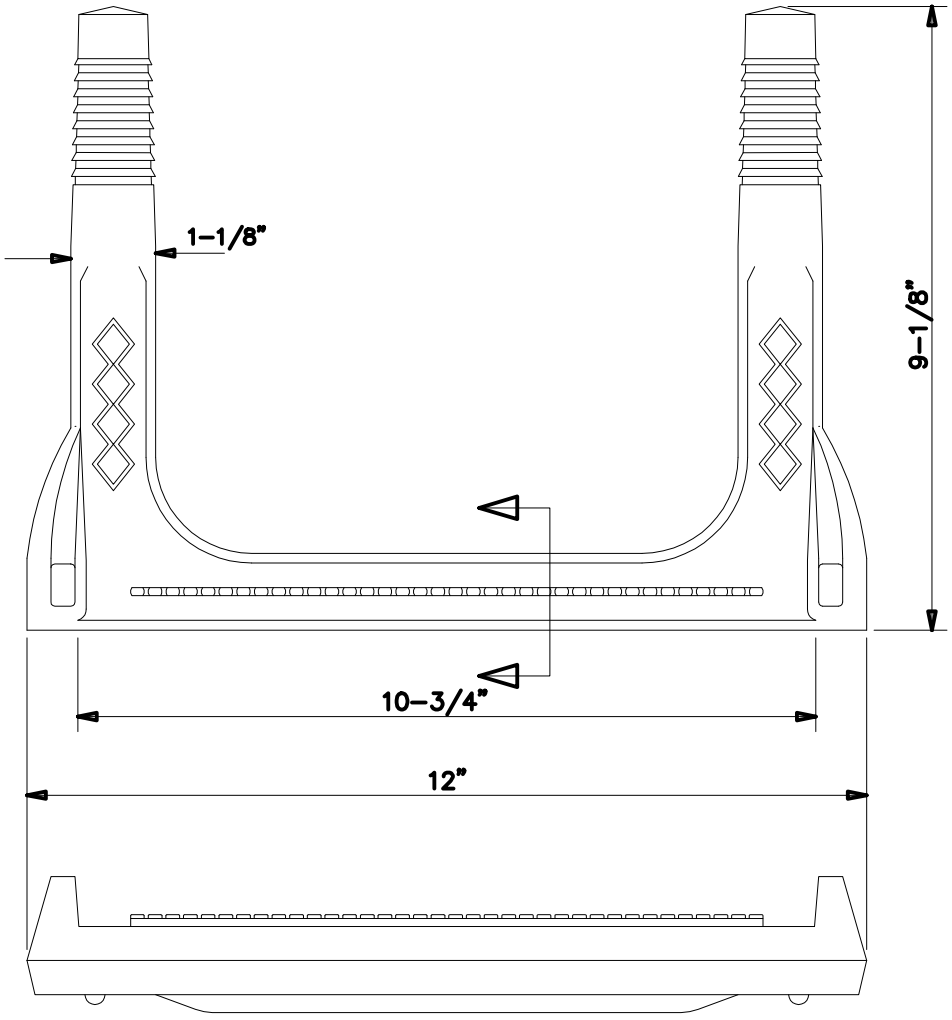
VILLAGE OF MT. ORAB UTILITY DEPARTMENT	MANHOLE FRAME WITH SELF SEALING LID	DRAWING NO. S1.7.0
APPROVED _____ DATE _____ REVISED JUNE 2013		

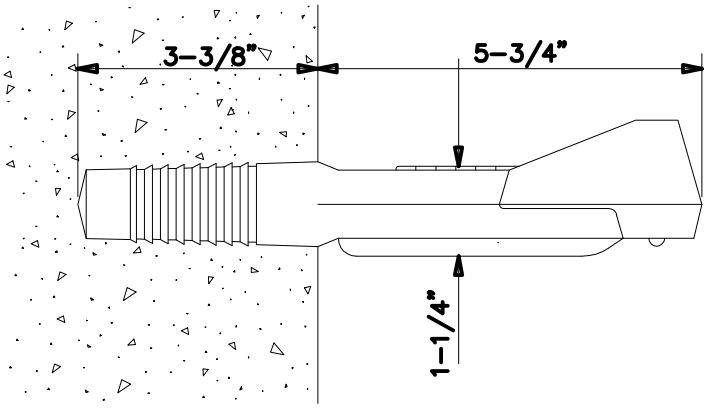




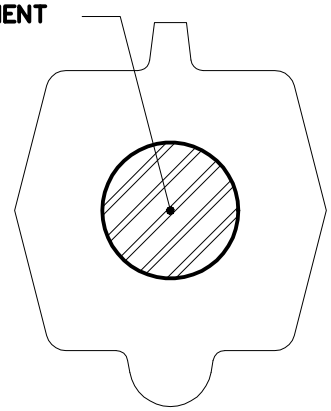
NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	WATERTIGHT FRAME WITH BOLT DOWN LID	DRAWING NO. S1.8.0
APPROVED _____ DATE _____ REVISED JUNE 2013		





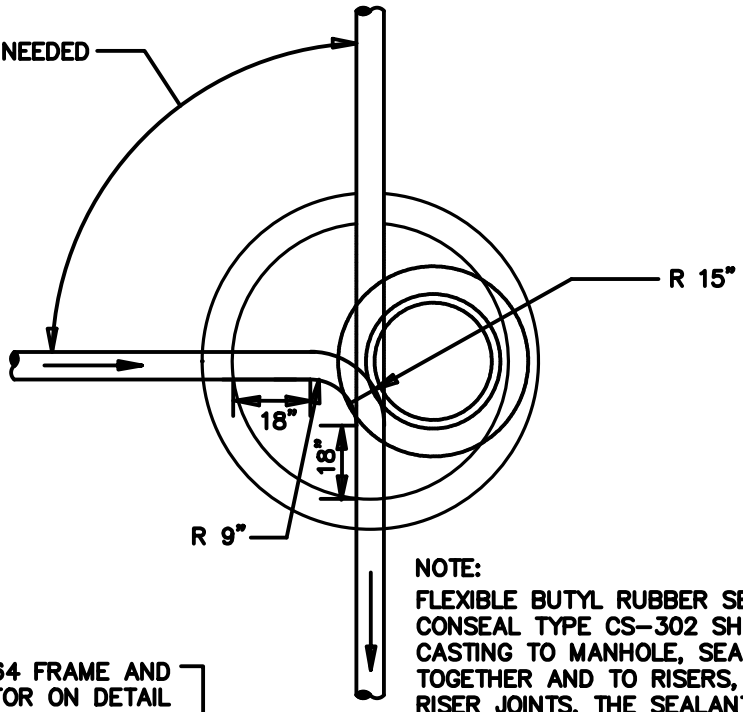
1/2"ø GRADE 60
STEEL REINFORCEMENT



SECTION

NO SCALE

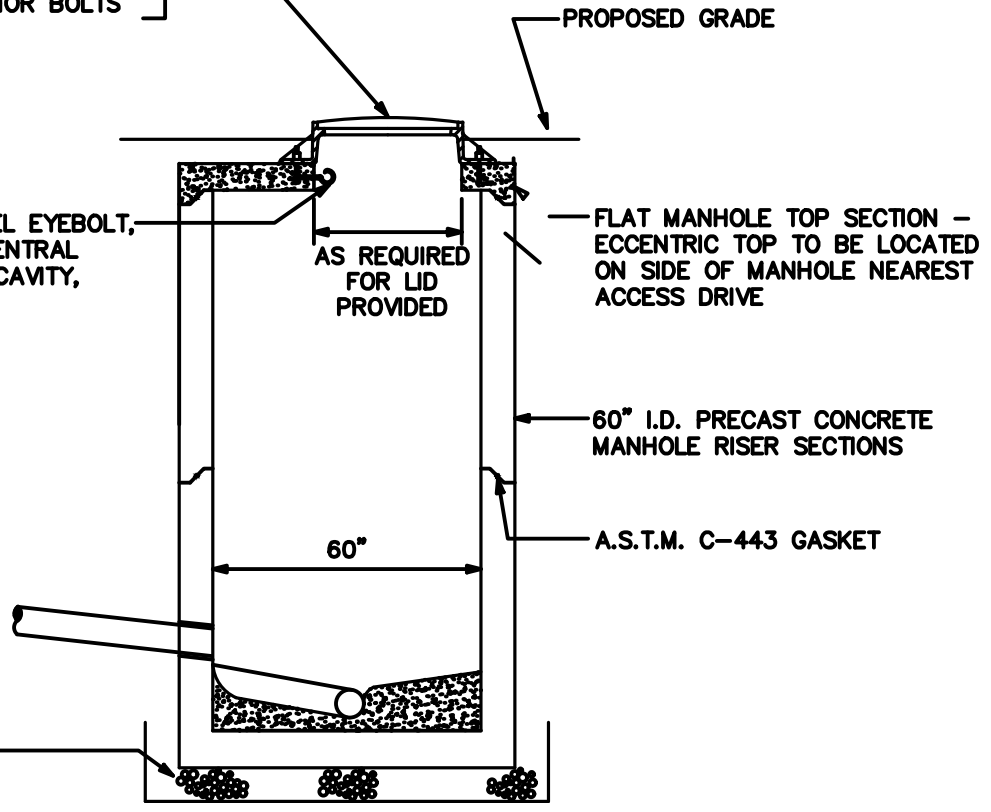
VILLAGE OF MT. ORAB UTILITY DEPARTMENT	MANHOLE STEP- COPOLYMER	DRAWING NO. S1.9.0
APPROVED _____ DATE _____		



NOTE:
FLEXIBLE BUTYL RUBBER SEALANT EQUAL TO CONSEAL TYPE CS-302 SHALL BE USED TO SEAL CASTING TO MANHOLE, SEAL ADJUSTING RINGS TOGETHER AND TO RISERS, AND TO SEAL MANHOLE RISER JOINTS. THE SEALANT MUST BE APPLIED TO THE OUTSIDE AND INSIDE HORIZONTAL PORTION OF EACH MANHOLE JOINT.

INSTALL NEENAH R-1664 FRAME AND SOLID LID AS CALLED FOR ON DETAIL S1.7, OR APPROVED EQUAL, WITH "SANITARY SEWER" LETTERING ON SURFACE OF LID.

FRAMES SHALL BE SECURED TO MANHOLE WITH 4-1" ANCHOR BOLTS AT 90° SEPARATION.



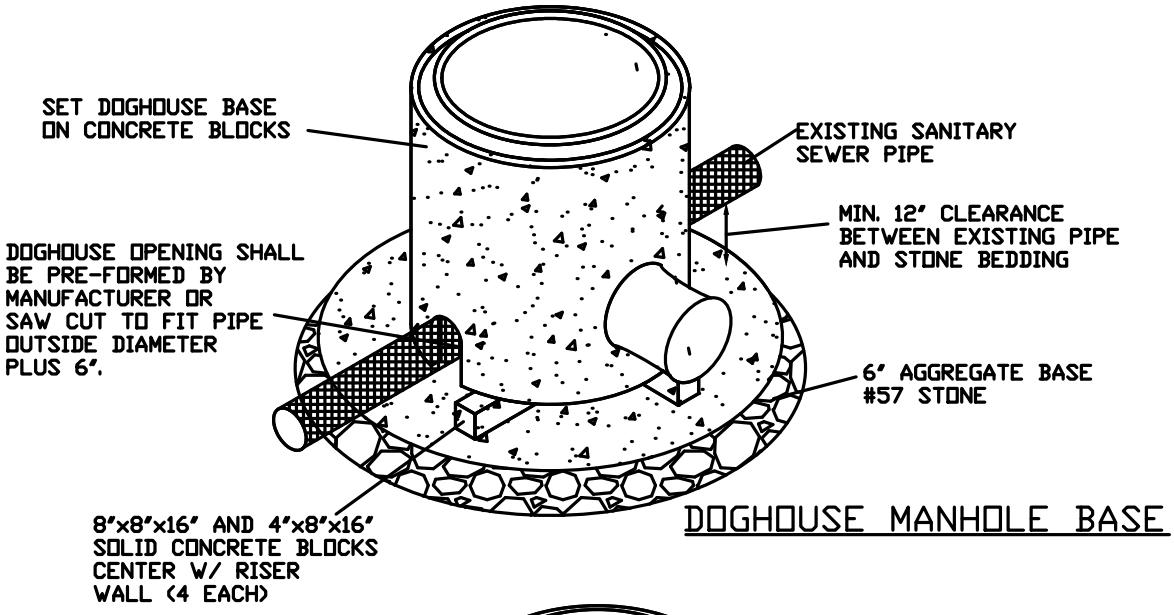
NOTE: SAMPLE MANHOLES ARE TO BE LOCATED OUT OF PAVED AREA WHERE EVER POSSIBLE. IF LOCATED IN PAVED AREA, MANHOLE SHALL NOT BE LOCATED IN LOW LAYING AREA.

NO SCALE

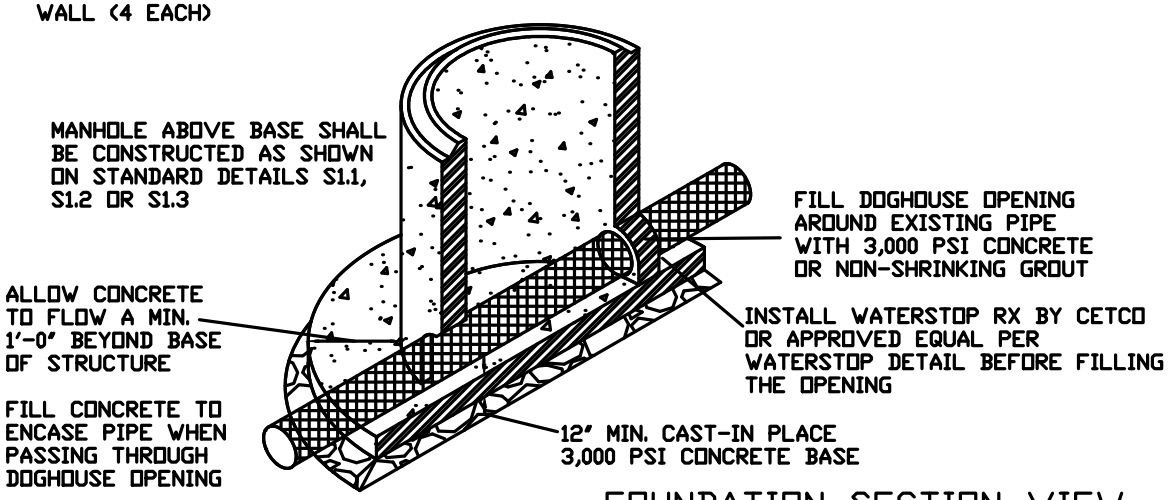
VILLAGE OF MT. ORAB UTILITY DEPARTMENT	INDUSTRIAL PRE-TREATMENT (IWPT) SAMPLING MANHOLE	DRAWING NO. S1.10.0
APPROVED _____ DATE _____		

REVISED APRIL 2018

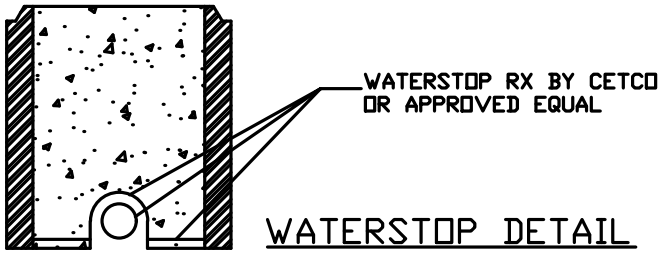
PRECAST CONCRETE MANHOLE BASES SHALL BE FABRICATED IN ACCORDANCE WITH SECTION 3200 OF THE CCWRD SPECIFICATIONS.



DOGHOUSE MANHOLE BASE



FOUNDATION SECTION VIEW

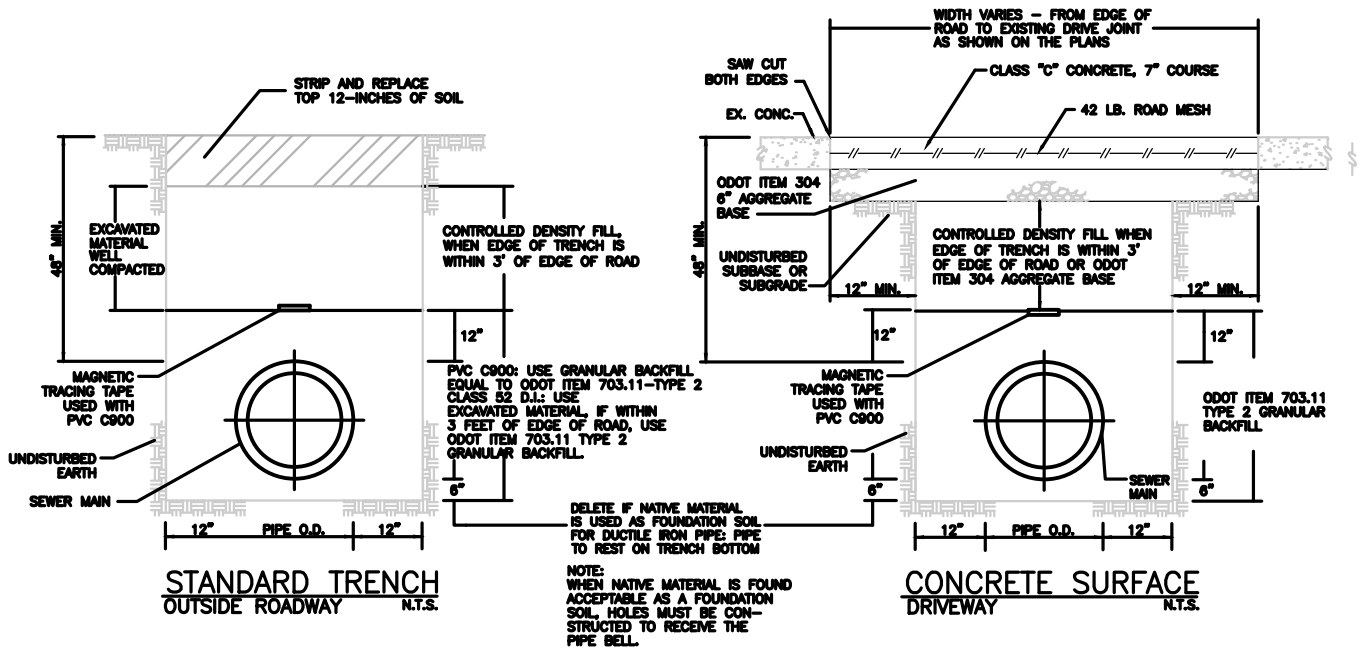


WATERSTOP DETAIL

NOTES:

1. CONSTRUCT A FORMED INVERT FROM NEW SEWER LINE TO ALLOW FLOW TO THE EXISTING PIPE.
2. POUR A BENCH TO THE LOWER HALF OF THE EXISTING PIPE.
3. CUT AND REMOVE THE TOP HALF OF EXISTING PIPE TO WITHIN 6" OF THE MANHOLE WALLS AFTER THE INVERT AND BENCH HAVE BEEN FORMED, AND THE MH HAS BEEN FULLY TESTED IN ACCORDANCE WITH CCWRD SPECIFICATIONS.

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	MANHOLE BASE "DOGHOUSE" INSTALLATION	DRAWING NO. S1.11.0
APPROVED _____ DATE _____		

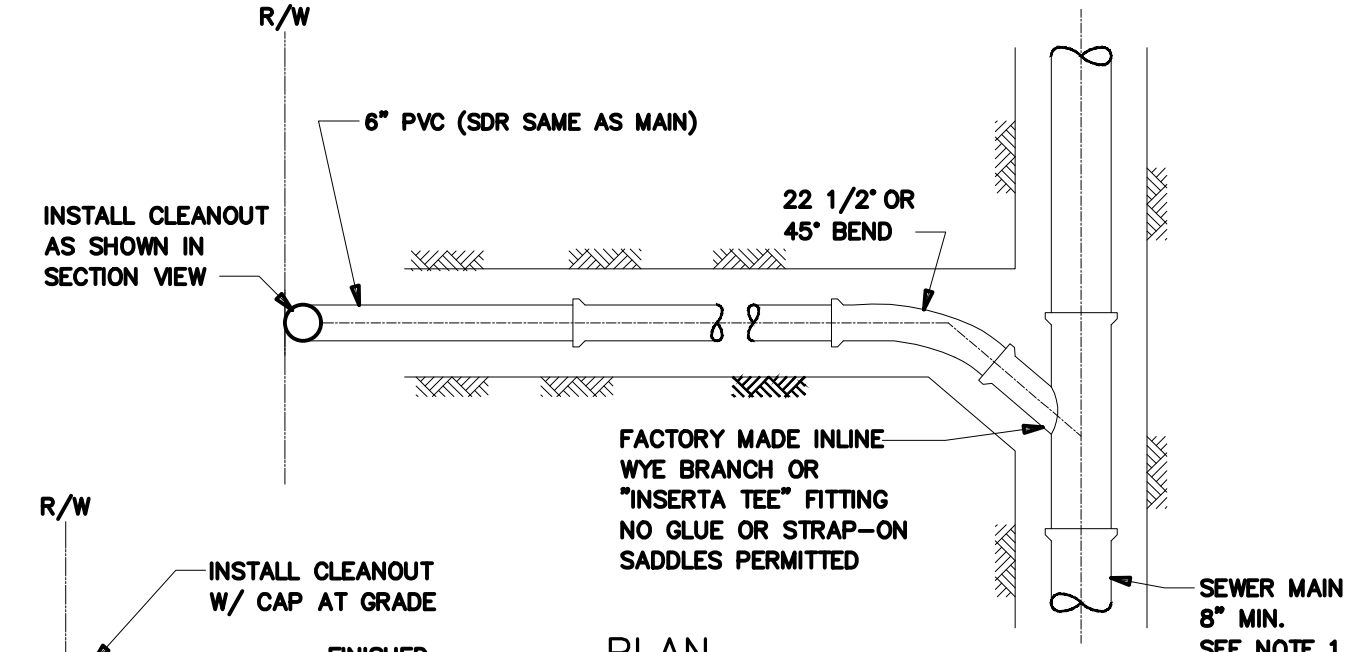


NOTES:

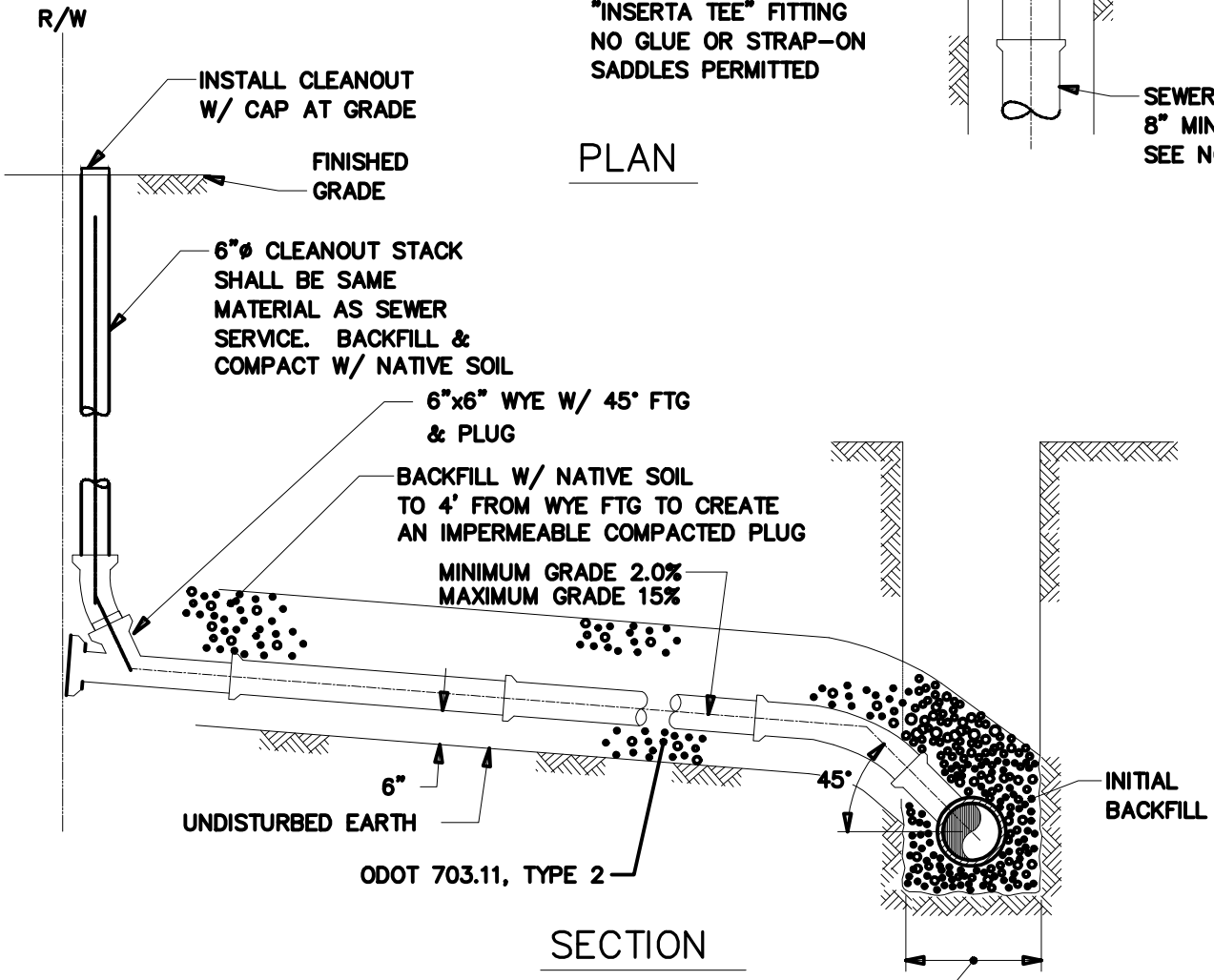
1. "PAVEMENT" AS USED IN THIS DETAIL SHALL ALSO MEAN SIDEWALKS, CURBS, SLABS & OTHER GRADED STRUCTURES.
2. ALL BACKFILL & BEDDING IS TO BE COMPACTED AS CALLED FOR IN THE SPECIFICATIONS.
3. BEDDING AND BACKFILL MATERIALS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION FOR THE SPECIFIC PIPE MATERIAL BEING INSTALLED.
4. 6' LONG CLAY BULKHEADS TO BE INSTALLED AROUND PIPE EVERY 100' IN ACCORDANCE WITH SECTION 1200 OF THE CCWRD SPECIFICATIONS.

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	SANITARY SEWER TRENCH SECTIONS	DRAWING NO. S2.1.0
APPROVED _____ DATE _____		



PLAN



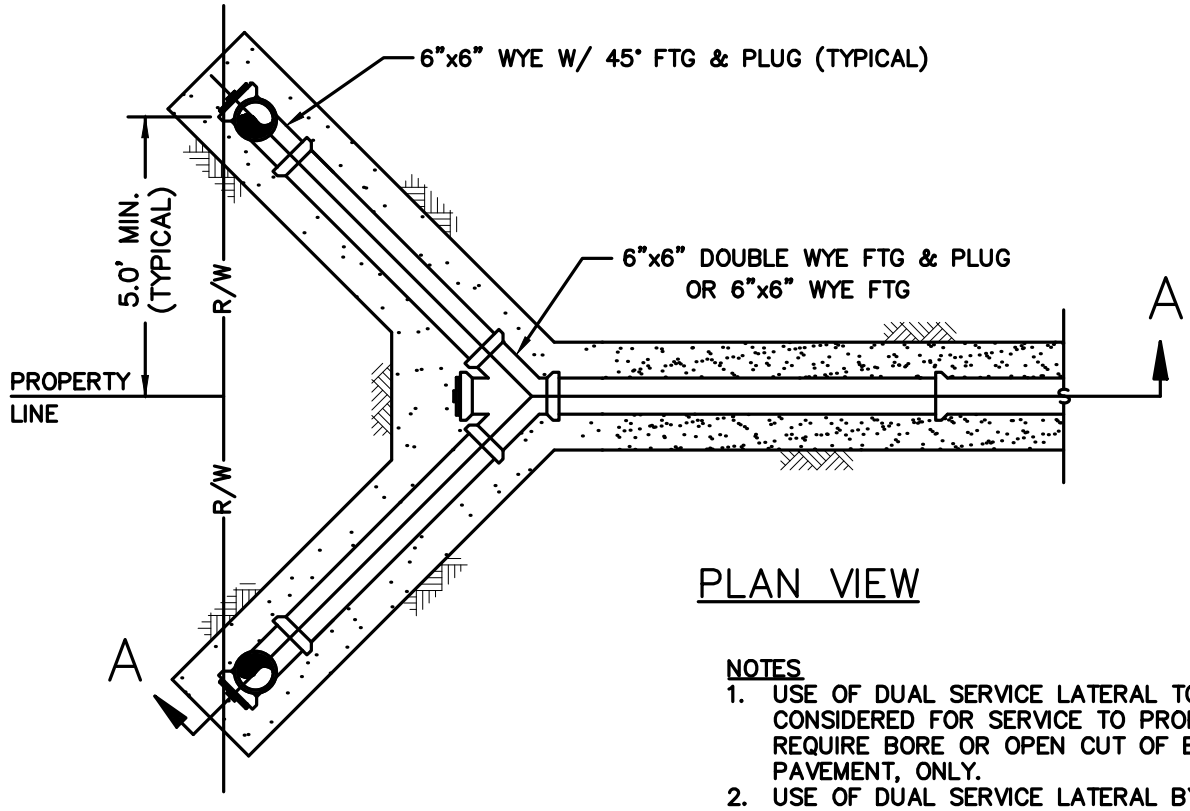
SECTION

NOTES:

1. SEWER LATERAL PIPE SHALL BE THE SAME MATERIAL AS THE MAIN (PVC SDR 35, 26, or 17)
2. DURING CONSTRUCTION OF THE SEWER MAIN AND LATERALS THE CLEANOUT SHALL BE BURIED APPROXIMATELY 3 FEET WITH A 2" BY 2" POLE SET ON THE BACK SIDE OF THE CLEAN OUT. WHEN THE STUCTURE IS CONNECTED, THE CLEANOUT SHALL BE BROUGHT TO GRADE AS DETAILED.

NO SCALE

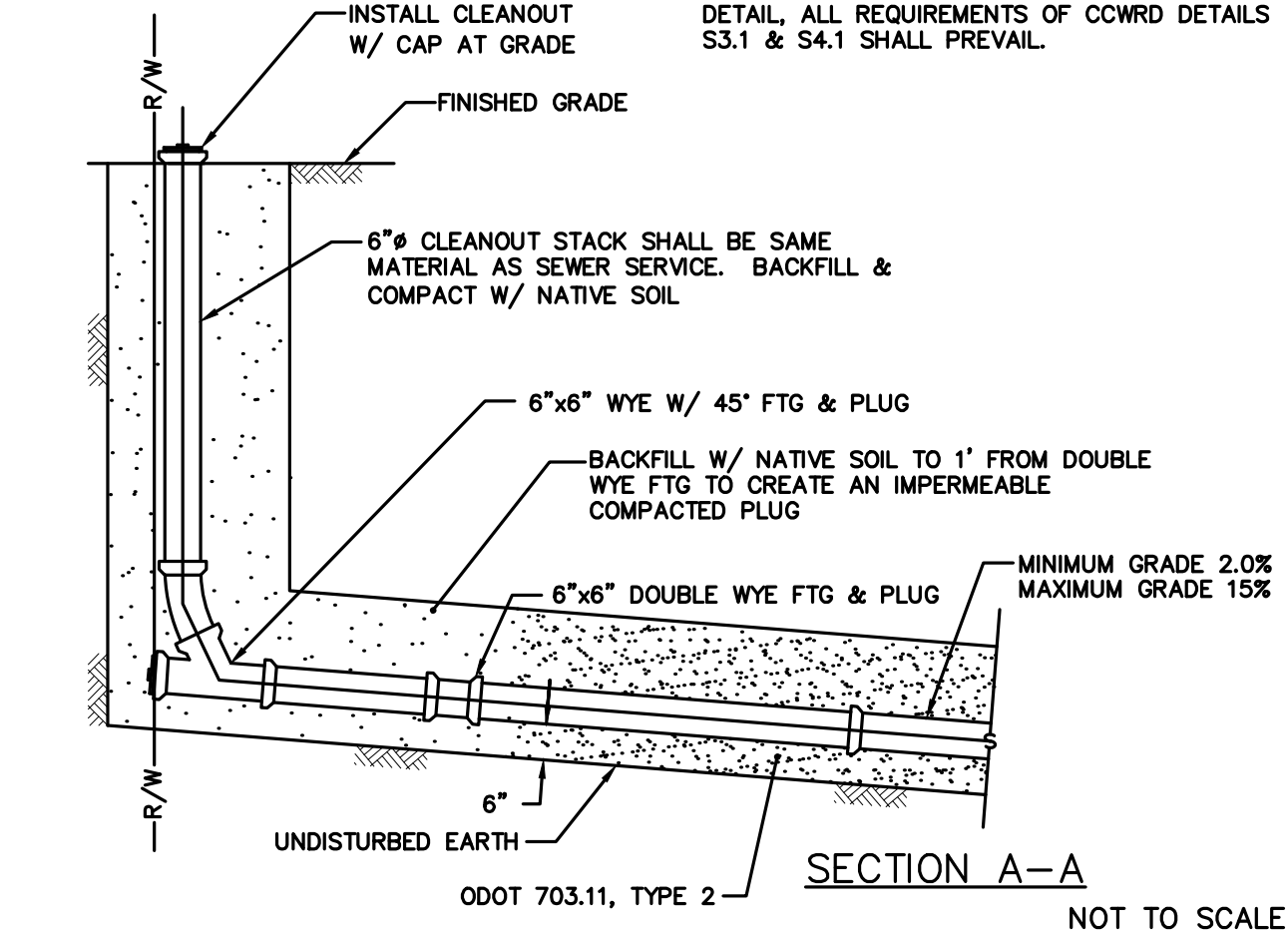
VILLAGE OF MT. ORAB UTILITY DEPARTMENT	SEWER LATERAL INSTALLATION	DRAWING NO. S3.1.0
APPROVED _____ DATE _____		



PLAN VIEW

NOTES

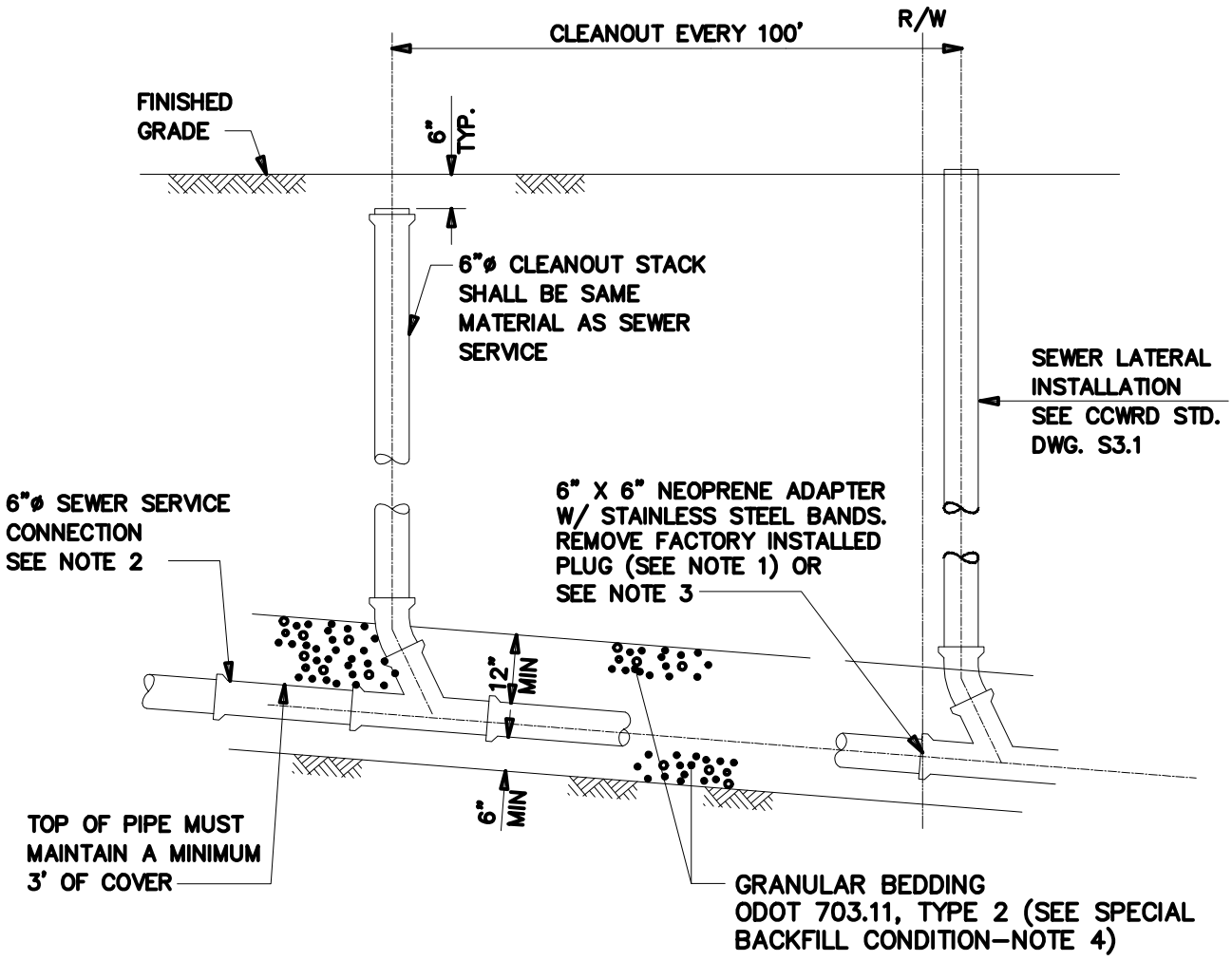
1. USE OF DUAL SERVICE LATERAL TO BE CONSIDERED FOR SERVICE TO PROPERTIES WHICH REQUIRE BORE OR OPEN CUT OF EXISTING PAVEMENT, ONLY.
2. USE OF DUAL SERVICE LATERAL BY APPROVAL OF THE DIRECTOR OF UTILITIES, ONLY.
3. WHERE NOT SPECIFICALLY ATLERED BY THIS DETAIL, ALL REQUIREMENTS OF CCWRD DETAILS S3.1 & S4.1 SHALL PREVAIL.



SECTION A–A

NOT TO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	DUAL SERVICE RESIDENTIAL LATERAL	DRAWING NO. S3.2.0
APPROVED _____ DATE _____		

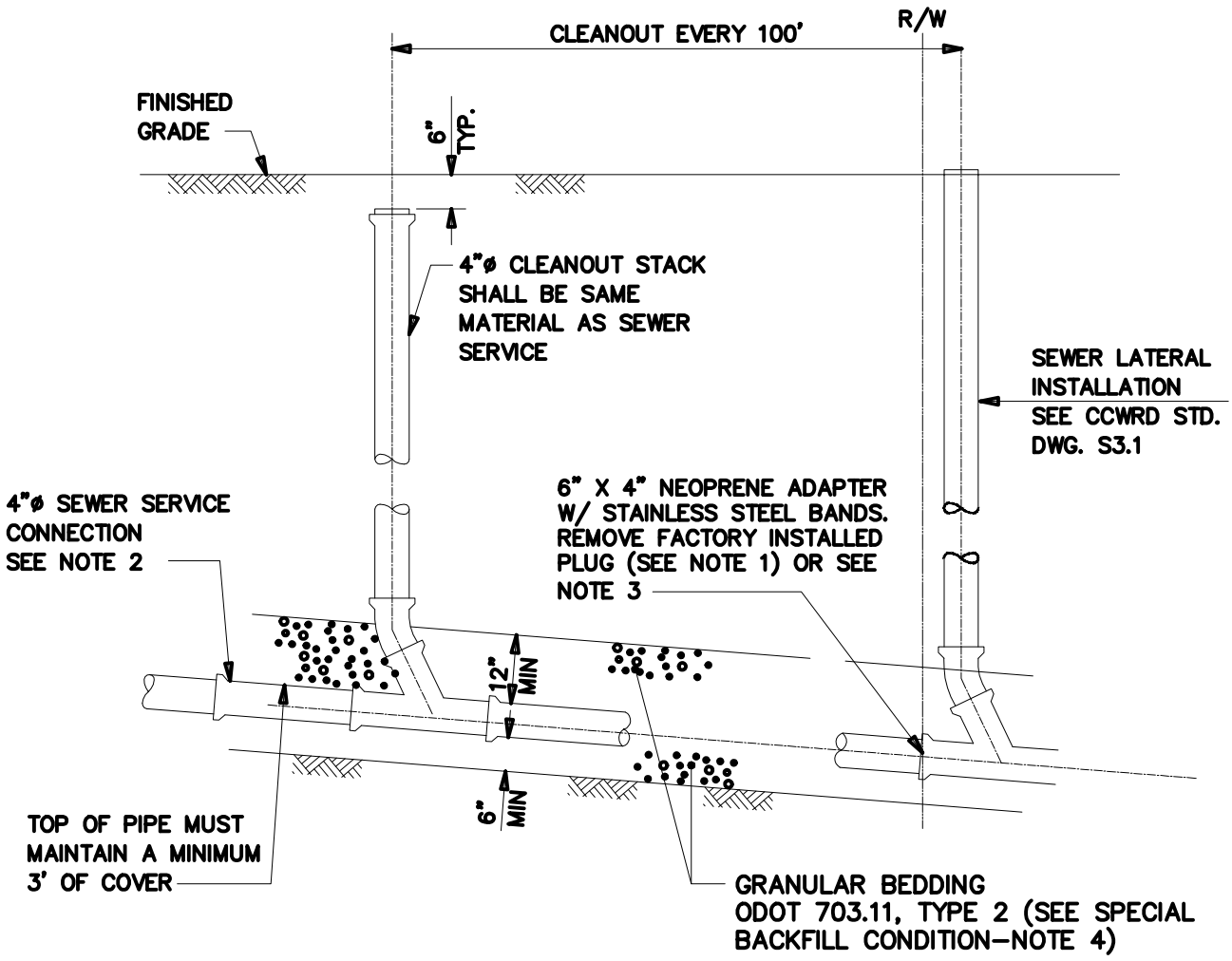


NOTES:

1. SEWER SERVICE CONNECTION TO SEWER LATERAL SHALL BE BY MEANS OF FLEXIBLE PIPE CONNECTORS (SHIELDED COUPLING AND DONUT TYPE) WHEN JOINING PIPES OF DIFFERENT MATERIAL.
2. SEWER SERVICE PIPE MATERIAL SHALL BE ANY OF THE FOLLOWING: PVC SCH–40 SOLID WALL, ASTM–D3034 WITH GLUED JOINTS, PVC SDR 35, OR (WHEN SEWER IS 15' OR DEEPER) PVC SDR 26
3. IN LIEU OF CONNECTING TO THE WYE FITTING AT THE R/W LINE, THE BUILDING SEWER MAY BE CONNECTED DIRECTLY TO THE 6" CLEANOUT PIPE, USING THE APPROPRIATE FITTINGS AS EXPLAINED IN NOTE 1.
4. AT A DISTANCE APPROXIMATELY 20' FROM THE STRUCTURE NATIVE SOIL (IN LIEU OF ODOT 703.11) WILL BE USED AS BACKFILL FOR APPROXIMATELY 4' TO CREATE AN IMPERMEABLE COMPACTED PLUG.

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	COMMERCIAL SEWER SERVICE INSTALLATION	DRAWING NO. S4.1.0
APPROVED _____ DATE _____		



NOTES:

1. SEWER SERVICE CONNECTION TO SEWER LATERAL SHALL BE BY MEANS OF FLEXIBLE PIPE CONNECTORS (SHIELDED COUPLING AND DONUT TYPE) WHEN JOINING PIPES OF DIFFERENT MATERIAL.
2. SEWER SERVICE PIPE MATERIAL SHALL BE ANY OF THE FOLLOWING: PVC SCH–40 SOLID WALL, ASTM–D3034 WITH GLUED JOINTS, PVC SDR 35, OR (WHEN SEWER IS 15' OR DEEPER) PVC SDR 26
3. IN LIEU OF CONNECTING TO THE WYE FITTING AT THE R/W LINE, THE BUILDING SEWER MAY BE CONNECTED DIRECTLY TO THE 6" CLEANOUT PIPE, USING THE APPROPRIATE FITTINGS AS EXPLAINED IN NOTE 1.
4. AT A DISTANCE APPROXIMATELY 20' FROM THE STRUCTURE NATIVE SOIL (IN LIEU OF ODOT 703.11) WILL BE USED AS BACKFILL FOR APPROXIMATELY 4' TO CREATE AN IMPERMEABLE COMPACTED PLUG.

NO SCALE

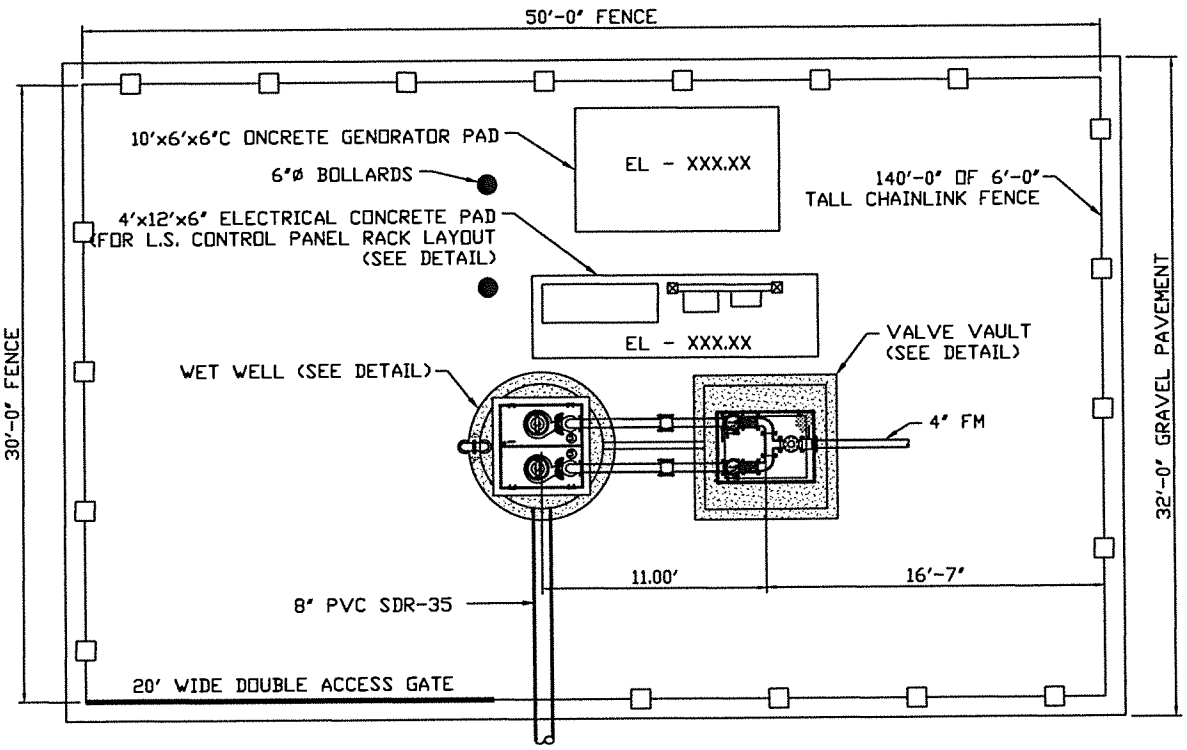
VILLAGE OF MT. ORAB UTILITY DEPARTMENT	RESIDENTIAL SEWER SERVICE INSTALLATION	DRAWING NO. S4.2.0
APPROVED _____ DATE _____		

NOTES:
1. SEWER LATERAL AND SEWER SERVICE CONNECTION TO BE CONSTRUCTED IN ACCORDANCE WITH CCWRD STANDARD DETAILS S3.1, S4.1, AND S4.2.
2. STRUCTURE PLUMBING SHOWN FOR REFERENCE ONLY. ALL INTERIOR PIPING SHALL BE IN ACCORDANCE WITH APPLICABLE PLUMBING CODES.

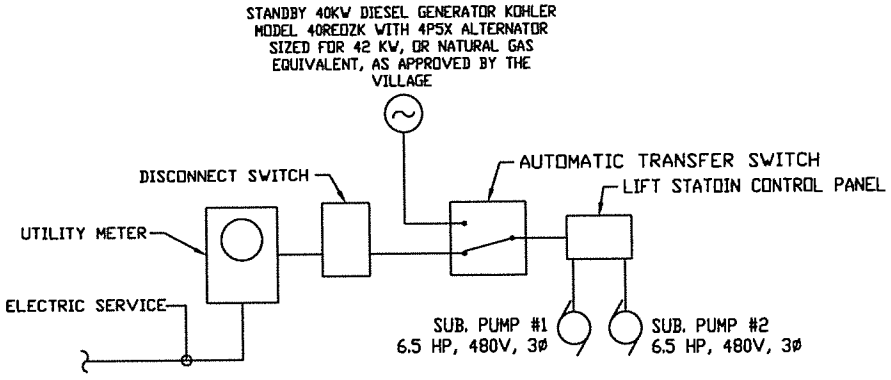
NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	STANDARD CONNECTION TO SEWERS 12" AND LARGER	DRAWING NO. S4.3.0
APPROVED _____ DATE _____		

OCTOBER 2016



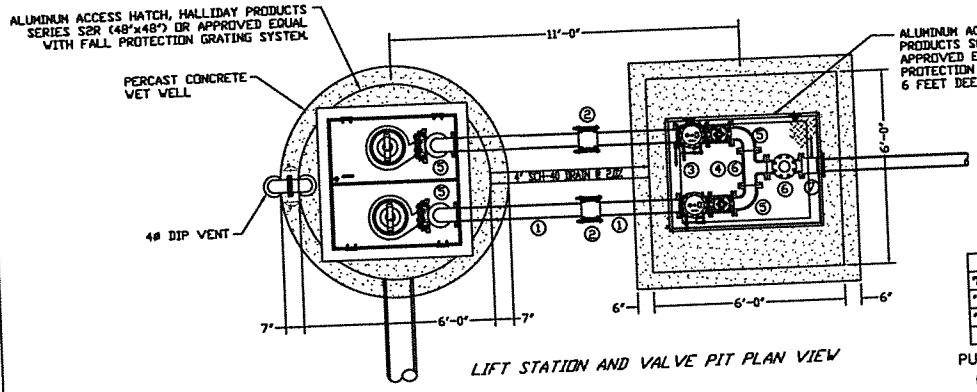
NOTE: DIMENSIONS SHOWN FOR REFERENCE ONLY. ALL DIMENSIONS AND ELEVATIONS SHOULD BE DESIGN SPECIFIC TO BE REVIEWED ON A CASE-BY-CASE BASIS BY THE VILLAGE PRIOR TO APPROVAL AND CONSTRUCTION.



ELECTRICAL SINGLE LINE DIAGRAM

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	LIFT STATION LAYOUT	DRAWING NO. S5.1
APPROVED _____ DATE _____ REVISED MAY 2025		



LIFT STATION AND VALVE PIT PLAN VIEW

PUMP CONTROL	ELEVATION
"HIGH LEVEL ALARM"	
"START LAG PUMP"	
"START LEAD PUMP"	
"PUMPS OFF"	

PUMP CONTROL ELEVATIONS

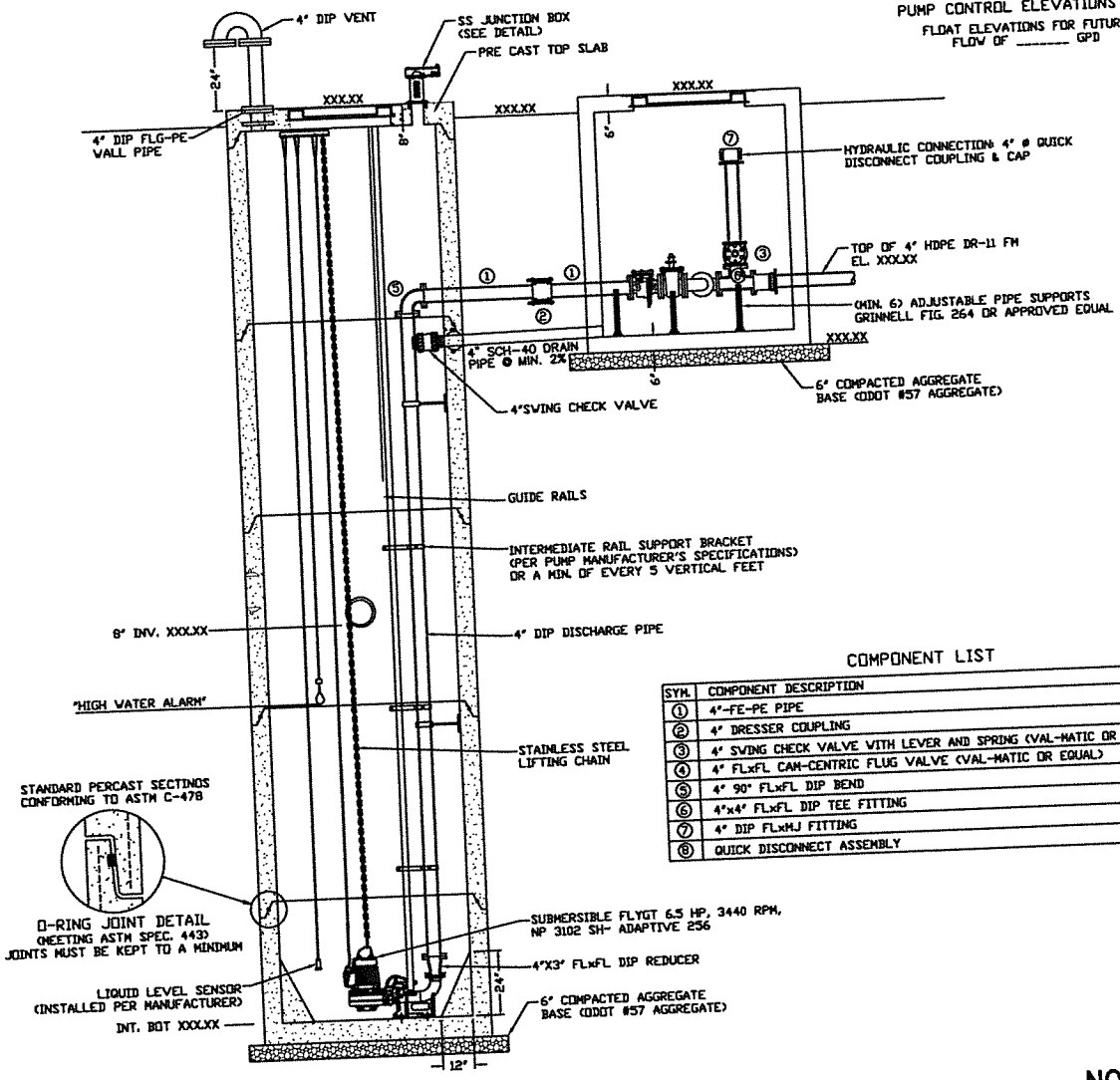
FLOAT ELEVATIONS FOR START-UP FLOW OF _____ GPD

PUMP CONTROL	ELEVATION
"HIGH LEVEL ALARM"	
"START LAG PUMP"	
"START LEAD PUMP"	
"PUMPS OFF"	

PUMP CONTROL ELEVATIONS

FLOAT ELEVATIONS FOR FUTURE FLOW OF _____ GPD

NOTE: DIMENSIONS SHOWN FOR REFERENCE ONLY. ALL DIMENSIONS AND ELEVATIONS SHOULD BE DESIGN SPECIFIC TO BE REVIEWED ON A CASE-BY-CASE BASIS BY THE VILLAGE PRIOR TO APPROVAL AND CONSTRUCTION.



WET WELL & VALVE PIT ELEVATION VIEW

COMPONENT LIST

SYM.	COMPONENT DESCRIPTION
①	4"-FE-PE PIPE
②	4" DRESSER COUPLING
③	4" SWING CHECK VALVE WITH LEVER AND SPRING (VAL-MATIC OR EQUAL)
④	4" FLxFL CAM-CENTRIC PLUG VALVE (VAL-MATIC OR EQUAL)
⑤	4" 90° FLxFL DIP BEND
⑥	4"x4" FLxFL DIP TEE FITTING
⑦	4" DIP FLxMJ FITTING
⑧	QUICK DISCONNECT ASSEMBLY

NO SCALE

VILLAGE OF MT. ORAB
UTILITY DEPARTMENT

APPROVED _____

DATE _____

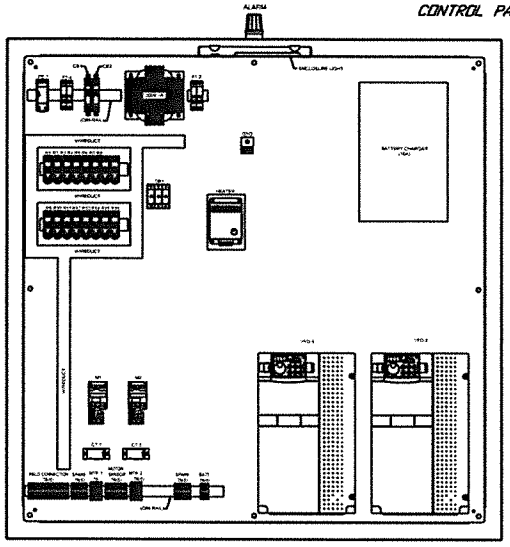
REVISED MAY 2025

LIFT STATION DETAIL

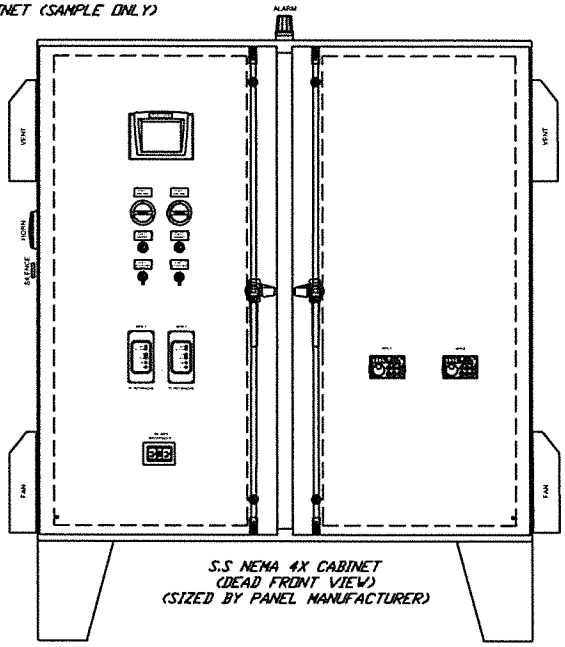
DRAWING NO.

S5.1.2

CONTROL PANEL CABINET (SAMPLE ONLY)



S.S NEMA 4X CABINET
(BACK PLATE VIEW)
(SIZED BY PANEL MANUFACTURER)



S.S NEMA 4X CABINET
(DEAD FRONT VIEW)
(SIZED BY PANEL MANUFACTURER)

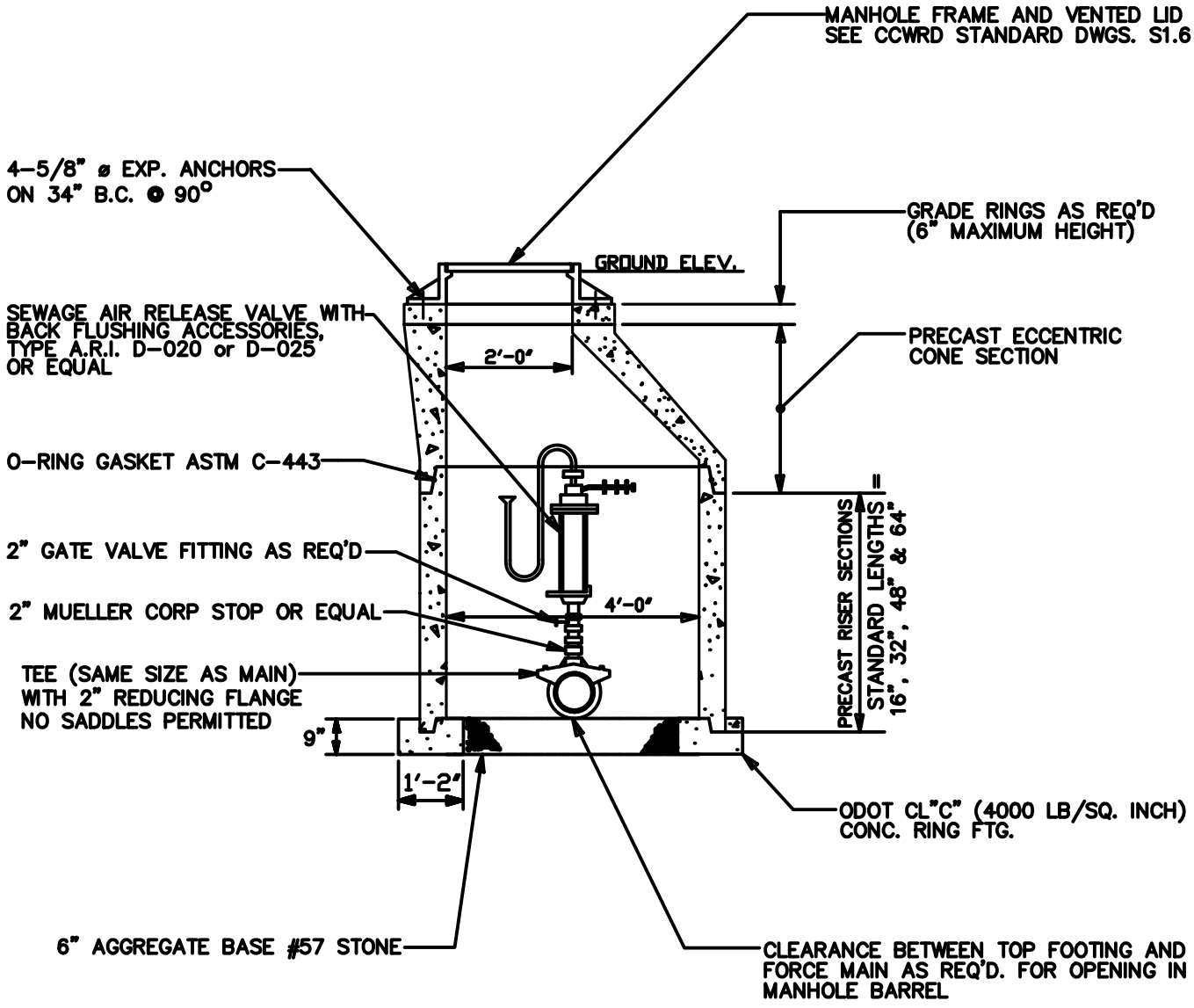
NEMA 4X PUMP CONTROL PANEL DEVICE LEGEND

- CONTROL PANEL ENCLOSURE: SAGINAW CONTROL & ENGINEERING MODEL WITH BACK PANEL, DOOR STOP KIT, FANS AND VENTS (SIZED BASED ON REQUIRED PUMPS).
- (LEVEL VIEW) DUPLEX PUMP CONTROLLER: LEVEL VIEW CONTROLLER BY PRIMEX CONTROLS (PUMP WATCH AND SCADA)
- PANEL SHALL INCLUDE BREAKERS FOR THE GENERATOR BATTERY CHARGER AND BLOCK HEATER.
- VFD (SIZED FOR FLA OF THE SUBMERSIBLE PUMPS)
- (GFCI) GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE - PART #N7589-W WITH A STAINLESS STEEL DEVICE MOUNT. PART #84401-40 BY LEVITON
- (HEATER) - ELECTRIC HEATER - 120V, W/ THERMOSTAT, BY HOFFMAN (SIZED ACCORDINGLY)
- (ENCLOSURE LIGHT) - BAR, 90-260V, SCREW MOUNTING TYPE, PART #LEDA1S35 BY PENTAIR
- REMOTE DOOR SWITCH ASSEMBLY - ACTIVATES LIGHT WHEN DOOR IS OPEN, PART #ALFSWD BY HOFFMAN.
- (ETM1-2) ELAPSED TIME METER - 6/DIGIT, QUARTZ, FLANGE MOUNT, 120V, PART #T5082 BY ENM COMPANY.
- LTG) - PILOR LIGHT, 22mm, 120V, GREEN COLOR, PART #XB4BVG3 BY SCHNEIDER ELECTRIC
- (HOA1-2) SELECTOR SWITCH - 3-POSITION, 600V, 22mm, BLACK KNOB, PART #B4BJ33 BY SCHNEIDER ELECTRIC.
- (SILENCE) NON-ILLUMINATED PUSHBUTTON - 600V, 22mm, BLACK BUTTON, PART #XB4BA21 BY SCHNEIDER ELECTRIC.
- ALARM LIGHT - FLASHING, RED LED, 120V, PART #SBN120AC-R BY INGRAM PRODUCTS.
- ALARM HORN - HEAVY DUTY OUTDOOR HORN, 120V, PART #AH015ABG BY INGRAM PRODUCTS.

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	CONTROL PANEL CABINET DETAIL	DRAWING NO.
APPROVED _____ DATE _____		

REVISED MAY 2025



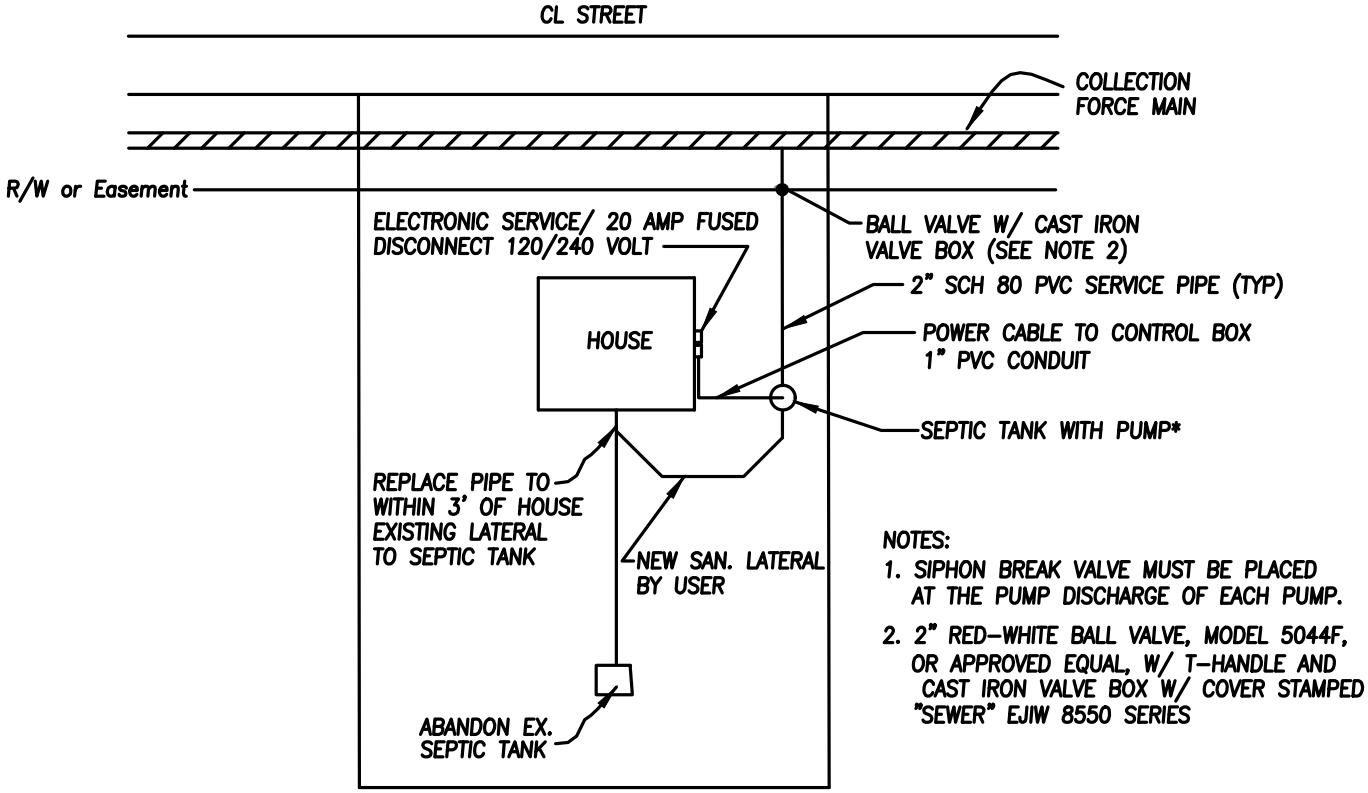
NOTE:

FLEXIBLE BUTYL RUBBER SEALANT EQUAL TO CONSEAL TYPE CS–302 SHALL BE USED: TO SEAL CASTING TO MANHOLE, TO SEAL ADJUSTING RINGS TOGETHER AND TO RISERS, AND TO SEAL MANHOLE RISER JOINTS.

INSTALL KOR–N–SEAL GASKETS AT MANHOLE INTERFACE WITH PIPE

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	AIR RELEASE VALVE IN MANHOLE	DRAWING NO. S5.2.3
APPROVED _____ DATE _____		



** Village of Mt. Orab Utility Dept. shall work with home owners and pump manufacturer to determine septic tank and pump location. Septic tank to be located as close to residence and roadway as possible.*

TYPICAL RESIDENTIAL CONNECTION

NO SCALE

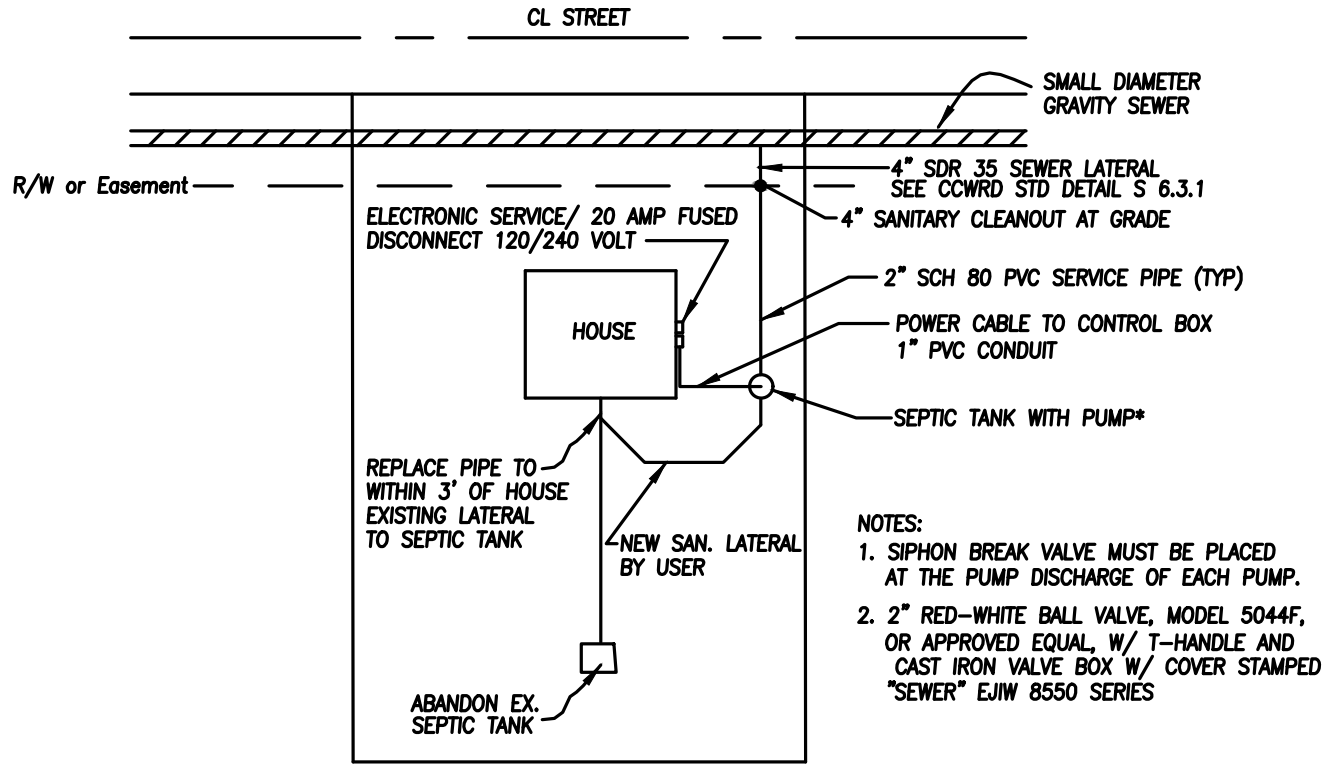
VILLAGE OF MT. ORAB UTILITY DEPARTMENT APPROVED _____ DATE _____ REVISED APRIL 2016	TYP. RESIDENTIAL STEP CONNECTION TO A FORCE MAIN	DRAWING NO. S6.2.0

TYPICAL LATERAL INSTALLATION

N.T.S.

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	HIGH PRESSURE FORCE MAIN LATERAL INSTALLATION	DRAWING NO. S6.2.1
APPROVED _____ DATE _____		

REVISED OCT. 2024

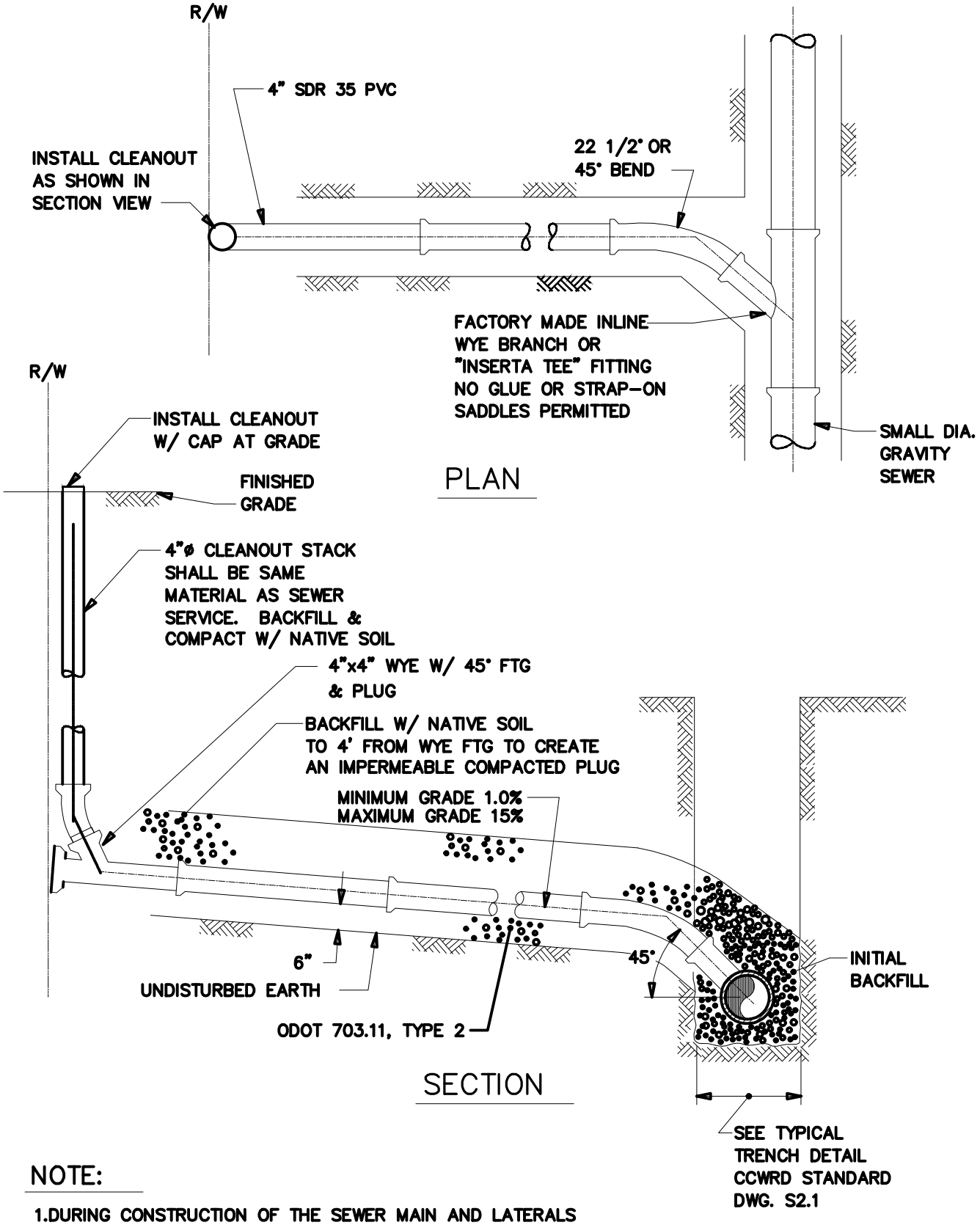


* CCWRD shall work with home owners and pump manufacturer to determine septic tank and pump location. Septic tank to be located as close to residence and roadway as possible.

TYPICAL RESIDENTIAL CONNECTION

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT APPROVED _____ DATE _____ REVISED APRIL 2016	TYP. RESIDENTIAL STEP CONNECTION TO SMALL DIAMETER GRAVITY SEWER	DRAWING NO. S6.3.0

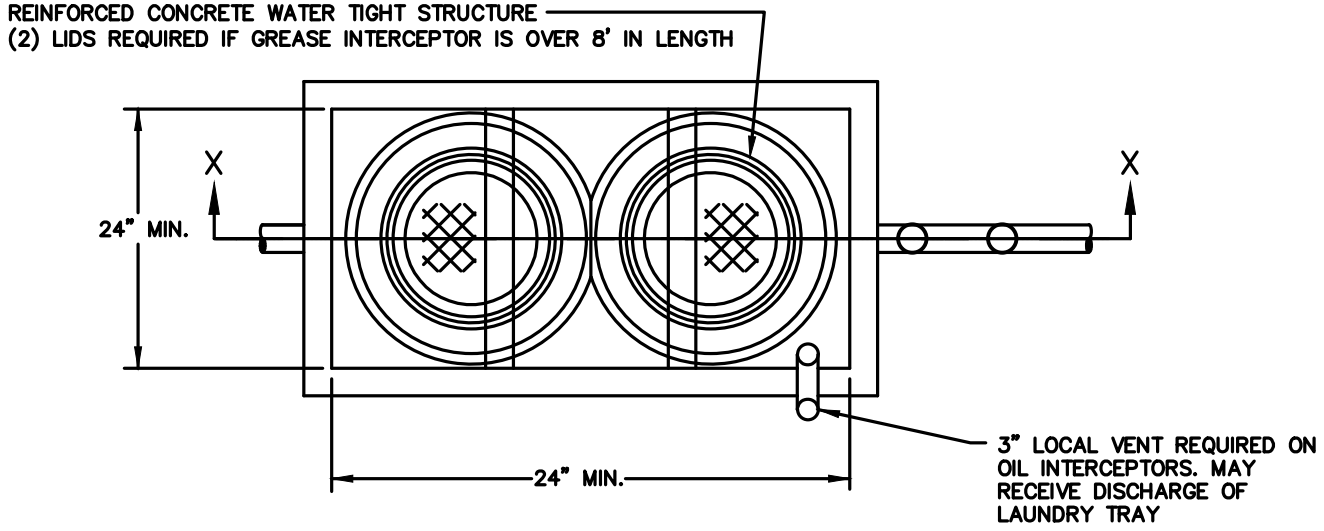


NOTE:

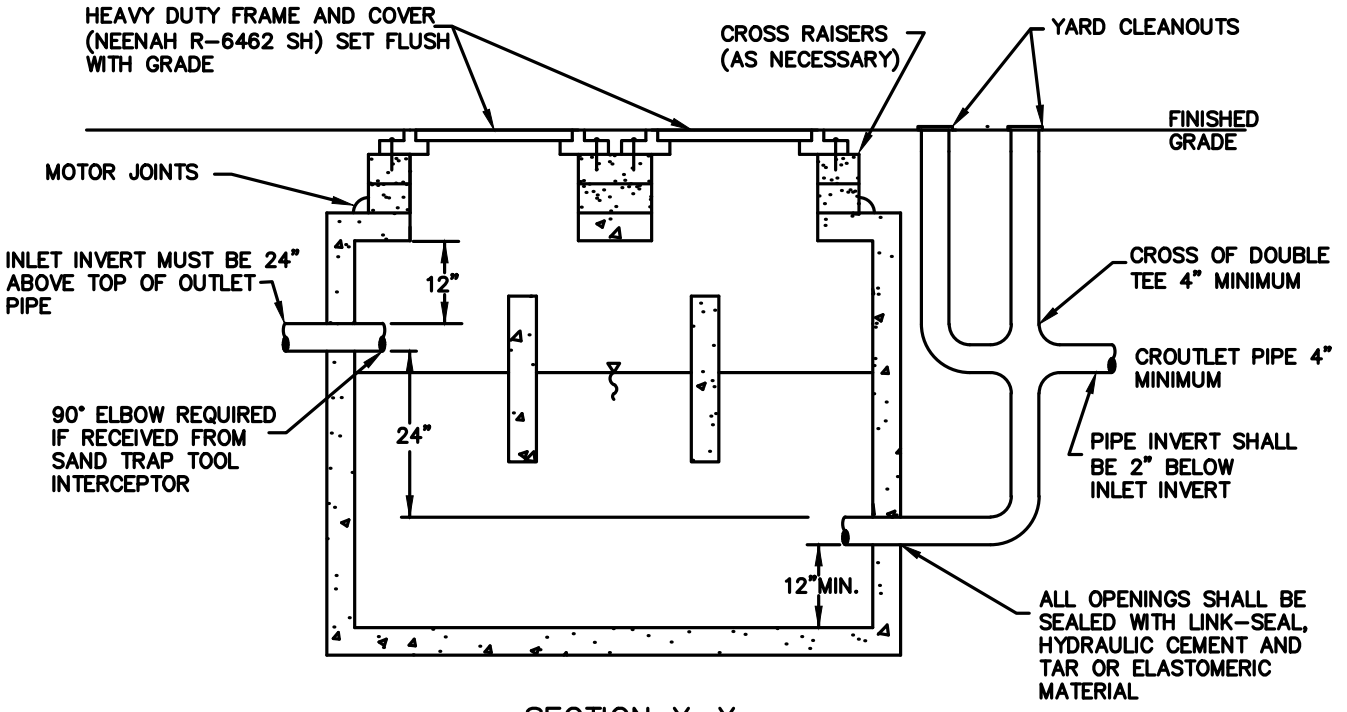
1. DURING CONSTRUCTION OF THE SEWER MAIN AND LATERALS THE CLEANOUT SHALL BE BURIED APPROXIMATELY 3 FEET WITH A 2" BY 2" POLE SET ON THE BACK SIDE OF THE CLEAN OUT. WHEN THE STUCTURE IS CONNECTED, THE CLEANOUT SHALL BE BROUGHT TO GRADE AS DETAILED.

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	SMALL DIAMETER GRAVITY SEWER LATERAL INSTALLATION	DRAWING NO. S6.3.1
APPROVED _____ DATE _____		



PLAN



SECTION X-X

NOTES:

1. DRAWING IS FOR REFERENCE ONLY, NOT FOR CONSTRUCTION.

2. INTERCEPTOR SHALL BE DESIGNED AND SIZED IN ACCORDANCE WITH OAC 4101:3-10-01.

3. GRIT TRAP MAY BE REQUIRED FOR SPECIFIC USES DETERMINED BY THE VILLAGE.
   *TO BE REVIEWED ON A CASE-BY-CASE BASIS.
   *CONTACT VILLAGE UTILITY DEPT.

NO SCALE

VILLAGE OF MT. ORAB UTILITY DEPARTMENT	GRAVITY GREASE INTERCEPTOR	DRAWING NO. S7.1.0
APPROVED _____ DATE _____		

APPENDIX C

Village of Mt Orab

Subdivision Street Design and

Construction Standards

Acknowledgements and Intent:

The Village of Mount Orab would like to thank the Clermont County Building Inspection Department (CCBID), Clermont County Engineer, Clermont County Water Resources Department, Clermont County Board of Commissioners, and the City of Milford, Ohio for allowing the Village of Mt Orab utilization of the Clermont and Milford Fire Department Regulations and Standards.

The intent of these regulations is to provide the developers, construction professionals, building professionals, citizens, and all other users with similar regulations for the region. Many differences are historical.

Notice: Some Mount Orab regulations are unique to the Village. Sections of the regulations that differ from Clermont County Regulations are clearly marked.

SUBDIVISION AND COMMERCIAL/INDUSTRIAL DEVELOPMENT PUBLIC STREET DESIGN AND CONSTRUCTION STANDARDS FOR VILLAGE OF MT. ORAB (BROWN COUNTY), OHIO

ADOPTED BY THE

Village of Mt. Orab, Ohio Village Council

Adopted: October 21, 2025

Prepared By:

Viox & Viox, Inc.
602 Lila Avenue
Milford, OH 45150

TABLE OF CONTENTS

ARTICLE 1
CONSTRUCTION PROCEDURE AND MATERIALS

SECTION 100 - GENERAL

A. Unless otherwise stated in these regulations, the following accepted standards will be enforced by the Village of Mt. Orab Engineer's office during the review and inspection of all new infrastructure:

1) State of Ohio, Department of Transportation, *Construction and Material Specifications*, current edition.

2) Ohio Department of Transportation, *Location and Design Manual, Volumes I and II*, current edition.

3) Ohio Department of Transportation, *Roadway Standard Construction Drawings*, current edition.

4) Ohio Department of Transportation, *Ohio Manual of Uniform Traffic Control Devices*, current edition.

5) Village of Mt. Orab, Ohio, *Water Management and Sediment Control Regulations*, current edition.

B. **PRECONSTRUCTION MEETING -** Prior to the start of any/all construction activities, a preconstruction meeting must take place with representatives of the Village of Mt. Orab Engineer, the Village of Mt. Orab Sewer and Water District, and the Village of Mt. Orab Building Department.

C. **FEE SCHEDULE** – Plan review fees and construction inspection fees are required. The schedule of plan review and inspection fees may be obtained at the Village of Mt. Orab Engineer's Office or Village of Mt. Orab's Permit Central. An additional fee will be collected to cover the cost of videotaping the storm sewer system. The fee will be based upon the County's current videotaping contract.

D. **INSPECTIONS -** Representatives of the Village of Mt. Orab Engineer's Office shall make Inspections during the installation of improvements to insure conformity with Subdivision Street Design and Construction Standards for Village of Mt. Orab, as well as, other Village of Mt. Orab Standards and Specifications.

E. **MATERIAL TESTING** – Testing of materials shall be performed by an approved geotechnical firm to insure conformity with Subdivision Street Design and Construction Standards for Village of Mt. Orab. A minimum of twenty-four (24) hour notice shall be required prior to inspection work. The Village of Mt. Orab Engineer's Office will be responsible for all concrete and asphalt testing unless otherwise specified.

F. **SOILS** - All soils testing are to be the responsibility of the contractor. An independent geotechnical firm will determine the maximum dry density and percent of compaction. Compaction testing must be performed by a geotechnical firm approved by the Village of Mt. Orab Engineer prior to testing procedures. While embankment operations are being conducted, the geotechnical firm shall visit the site no less than twice each day (morning and afternoon) to perform necessary compaction tests. The contractor is responsible for supplying the inspector with copies of the test results weekly. From October 1 to April 15, compaction tests on subgrade are <u>required</u> but may be requested anytime during the year by the inspector if they have determined that the tests are needed or if subgrade is questionable.

SECTION 101 – MATERIALS

All work and materials shall conform to the Ohio Department of Transportation Construction and

Material Specifications or as otherwise stated within.

SECTION 102 – EARTHWORK

A) **EMBANKMENT/EXCAVATION**

(1) All embankment/excavation activities shall adhere to Item 203 of the ODOT Construction and Material Specifications; and as stipulated below:

(2) All areas in which fill material is to be placed shall be free of unsuitable material.

(3) The material being used for fill must be free of organic and frozen material.

(4) The fill shall be placed and compacted in 8 inch lifts.

(5) If the slope of the existing ground meets or exceeds 8:1, benching is required per ODOT Item 203.05.

(6) Each lift must be compacted at not less than 98% of the maximum dry density of the soil being compacted.

B) **SUBGRADE**

(1) The sub-grade under new pavement and paved shoulders must be free of all organic material to a depth of 24 inches below the surface of the subgrade and to a width of 18 inches beyond the edge of the surface of the pavement or to the back of curb and gutter. Bridging of unsuitable material must be approved by the Village of Mt. Orab Engineer or a designated representative, prior to construction of and compaction of the subgrade.

(2) The subgrade surface shall be compacted to not less than 98% of the maximum dry density of the compacted soil (standard proctor) and sealed by using a steel drum roller with a minimum compaction rate of 10 tons. As an alternative, a loaded tandem axle truck or pan shall be utilized to proof roll the subgrade, which shall be witnessed and approved by the Village of Mt. Orab Engineer or designated representative.

(3) Soil stabilization techniques will be permitted by the Village of Mt. Orab Engineer pending written approval from the Village of Mt. Orab Engineer prior to any construction activities. The applicant must submit the type of soil stabilization and the pertinent calculations with his/her permit request. It is recommended that hydrated lime not be used and that an alternative material be utilized since air born hydrated lime is a respiratory hazard.

C) **GROUNDWATER –** The presence of groundwater or impermeable native soils may necessitate the use of underdrains or other approved methods to allow for proper subgrade drainage, as determined by the Village of Mt. Orab Engineer.

SECTION 103 - BASE

A. **ITEM 301 ASPHALT CONCRETE BASE**- This base must meet ODOT gradation and bitumen content (4 - 8 percent). The minimum temperature of the base when delivered to the paver is to be 250° F. The minimum surface temperature of subgrade is to be 36° F when paving 3 to 6 inches in depth. Base may not placed on soft and/or frozen subgrade.

B. **ITEM 304 AGGREGATE BASE**- This base must meet ODOT gradation. The maximum compacted layer shall be 6 inches. Water will be added to bring the base to optimum moisture prior to compaction. The county engineer's inspector shall perform a base grade check before the leveling

course of asphalt can be placed. All roadway sections utilizing Item 304 Aggregate Base shall require the use of Item 605 - Shallow Pipe Underdrains to adequately drain the aggregate base. The Village of Mt. Orab Engineer reserves the right to specify the use of an aggregate base typical section (with underdrains) in areas that exhibit poor drainage. See Typical Sections for details.

C. **GENERAL**- A steel drum roller with a minimum compaction rate of 10 tons shall be used to compact the base. The compacted finish is to be within ½ inch of the proposed elevation. The maximum compacted layer shall be 6 inches in depth and extend 6 inches beyond the pavement width except when curb is poured on subgrade. Asphalt testing and pavement coring will be the responsibility of the Village of Mt. Orab Engineer's Office.

SECTION 104 – PAVEMENT

A. **FLEXIBLE PAVEMENT** - (See Typical Sections for details)

1) ITEM 448 Asphalt Concrete Intermediate Course, Type 1, PG64-22- This item shall be used as a leveling course between the base and the final asphalt surface course. The composition must meet ODOT gradation and bitumen content. The maximum depth of any one layer shall be 3 inches and the minimum surface temperature shall be 40°F. The asphalt-leveling course shall not be placed the same day as the bituminous aggregate base.

2) ITEM 448 Asphalt Concrete Intermediate Course, Type 2, PG64-22- This item shall be used as a leveling course between the base and the final asphalt surface course. The composition must meet ODOT gradation and bitumen content. The minimum and maximum depth of any one layer shall be 1.75 inches and 4.5 inches and the minimum surface temperature shall be 40°F. The asphalt-leveling course shall not be placed the same day as the bituminous aggregate base.

~~**3)**~~ **ITEM 448 Asphalt Concrete Surface Course, Type 1, PG64-22** – This item shall be used as a final asphalt wearing course. The composition must meet ODOT gradation and bitumen content. The minimum and maximum depth of any one layer shall be 1.25 inches and 2.0 inches, respectively. The surface temperature shall to be 50° F or greater prior to the placement of any asphalt. A tack coat must be placed between the leveling and final wearing course at a rate of .10 gal/sy and along the face of curb. The leveling course must be pressure washed before the finish course is applied to ensure a clean and cohesive surface. ***The contractor must wait a minimum of one year before applying the finish course of asphalt to allow for building construction wear***.

4) GENERAL- The roller shall have a minimum compaction rate of 10 tons. The compacted finish shall be within ¼ inch of the proposed elevation. Asphalt testing and pavement coring will be the responsibility of the Village of Mt. Orab Engineer's Office.

B. **RIGID PAVEMENT (THE VILLAGE OF MT. ORAB DOES NOT CURRENTLY PROVIDE A TYPICAL SECTION FOR CONCRETE STREETS. PROPOSED CONCRETE STREETS TO BE REVIEWED AND APPROVED ON A CASE-BY-CASE BASIS AT THE DISCRETION OF THE VILLAGE ADMINISTRATION AND VILLAGE ENGINEER.)**

1) **ITEM 451 Reinforced Portland Cement Concrete Pavement** – This item will consist of a single course of pavement composed of Reinforced Portland Cement Concrete. The composition of all materials and construction must be in accordance with the current specifications of the Ohio Department of Transportation for Reinforced Portland Cement Concrete Pavement. In order to facilitate proper placement it is required that at least fifty percent (50%) of the concrete finishers on site will be ACI certified concrete finishers.

2) All concrete pavements shall be designed according to the Ohio Department of Transportation, *Pavement Design and Rehabilitation Manual*, current edition and the *Ohio Department of Transportation, Standard Roadway Construction Drawings,* current edition.

SECTION 105 – BONDING OF IMPROVEMENTS

A. BOND FOR INSTALLATION OF IMPROVEMENTS

1) So that Village of Mt. Orab has the assurance that the construction and installation of improvements will be completed, the developer shall enter into one of the following agreements:

   a. To construct all improvements directly affecting the subdivision, as required by the Village of Mt. Orab Board of Commissioners, prior to the approval of a final plat; or

   b. In lieu of the completion of the improvements, to execute a combination performance/maintenance bond securing it with a certified check, insurance policy, or letter of credit with the Village of Mt. Orab Board of Commissioners equal to the cost of construction of the uncompleted improvements based on an estimate by the Village of Mt. Orab Engineer.

B. CONDITIONS

1) At the end of each phase, a list of damaged or incomplete improvements will be sent to the developer to be completed before the bond will be converted or released. This list is to be completed to the satisfaction of the Village of Mt. Orab Engineer, or his representative, and the appropriate Township representative.

2) Before said security is accepted the proper administrative officials must approve it.

C. ACCEPTANCE

When the proper administrative officials, following final inspection of a subdivision, certify to the Village of Mt. Orab Board of Commissioners, that all improvements have been constructed in accordance with County specifications and to the, the Board of Commissioners may proceed to accept the facilities for which the security was posted.

D. FAILURE TO COMPLY

Whenever public improvements have not been constructed in accordance with the agreement, and with specifications as established, the Village of Mt. Orab Board of Commissioners may exercise its rights of foreclosure under the security agreement.

SECTION 106 – VARIANCES

A. The following regulations shall govern the granting of variances:

1) Where the Village of Mt. Orab Engineer's Office finds that extraordinary and unnecessary hardship may result from strict compliance with these regulations, due to exceptional topographic or other physical conditions, it may vary the regulations so as to relieve such hardship, provided such relief may be granted without detriment to the public interest and without impairing the intent and purpose of these regulations or the desirable development of the neighborhood and community. Such variations shall not have the effect of nullifying the intent and purpose of these regulations.

2) In granting variances or modifications, the Village of Mt. Orab Engineer's Office may require such conditions as will, in its judgement, secure substantially the objective of the standards or requirements so varied or modified.

3) Variances to these regulations shall be considered only upon receipt by the Village of Mt. Orab Engineer's Office of a written request from the developer or authorized representative.

ARTICLE 2
CONSTRUCTION REQUIREMENTS AND DESIGN STANDARDS

SECTION 200 GENERAL

A) All infrastructure improvements shall be designed and constructed in accordance with these regulations, and any other applicable regulation, as stated in Section 100.

B) The office of the Village of Mt. Orab Engineer shall be responsible for the approval of the inspection, as well as, construction of public improvement projects such as, roads, streets, alleys, storm drainage and/or other improvements within the right-of-way of a road, street and designated easement in any development within the unincorporated areas of Village of Mt. Orab.

C) It is the responsibility of the developer and/or consulting engineer to investigate local conditions that may require additional design/construction improvements. If, prior to or during construction, local conditions dictate additional improvements, as determined by the Village of Mt. Orab Engineer, such improvements shall be completed as a part of the subdivision project by the applicant.

D) Upon completion of all the improvements, the developer and/or contractor shall request, in writing, a final inspection walk through with representatives of Village of Mt. Orab Engineer's Office and a representative from the applicable township(s).

SECTION 201 STREET DESIGN

A) All proposed and/or new streets shall conform with/or compliment the Village of Mt. Orab Thoroughfare Plan. All existing and proposed streets shall be classified per the Village of Mt. Orab Thoroughfare Plan and constructed in accordance with the Subdivision Street Design and Construction Standards adopted by the Village of Mt. Orab Engineer.

SECTION 202 HORIZONTAL STREET ALIGNMENT

A) When there is an angle of deflection of more than one (1) degree between two (2) centerline tangent sections of a residential street, the following conditions shall be met:

1) The minimum allowable centerline radius shall be 200 feet for local/residential streets and 300 feet for Collector/Commercial/Industrial streets.

2) Horizontal sight distance per Table 201-2 E.

SECTION 203 VERTICAL STREET ALIGNMENT

A) Vertical curves shall be used at all points on the gradient where the algebraic difference is 2.00% percent or greater.

B) Vertical curve lengths shall be based on ODOT criteria for crest and sag vertical curves per Volume I of the Ohio Department of Transportation Location and Design Manual.

C) The maximum street grade shall be 10% for Local Streets, a maximum of 8% for Collector, and a maximum of 6% for Commercial and Industrial Streets.

SECTION 204 INTERSECTION DESIGN

A) All intersections shall be designed according to methods outlined in the current version of the "Manual of Location and Design – Volume I", prepared by the Ohio Department of Transportation (ODOT) and "A Policy on Geometric Design of Highways and Streets", prepared by the American Association of State Highway and Transportation Officials (AASHTO). The design and improvement standards for intersections are suggested minimums for all street intersections in subdivisions.

B) Street curb intersections shall be rounded by radii of a minimum of 30' for Local/Residential streets and a minimum of 40' for Collector/Commercial/Industrial streets at the back of curb.

C) The existing county or township road that provides access to a subdivision through an intersection with a proposed subdivision street must meet the guidelines set forth in Section 401 of the Ohio Department of Transportation *Location and Design Manual – Volume I*. If unique topographical conditions warrant a design exception, approval must be granted by the Village of Mt. Orab Engineer ensuring that safety and drainage criteria are met.

SECTION 205 SIDEWALK

A) Sidewalk (reference drawing STD01 and STD02) shall be placed within the public right-of-way. The top edge of the sidewalk closest to the curb shall be set 1 inch per foot ("/ft) from the top of the curb *(example: If the sidewalk is 7 feet from the curb, the side closest to the curb will be 7 inches higher than the curb).* Sidewalk shall be poured on a compacted and approved base per ODOT Item 608. See reference drawing STD03 for Handicap ramp layout.

SECTION 206 TEMPORARY T-TURNAROUND

A) A T-turnaround (reference drawing STD04) is required for a residential street that has 5 lots or more fronting a roadway that may be extended in the future. The T-turnaround shall be 40 feet long excluding the radius. The T-turnaround must stop 5 feet from the end of the pavement to allow room for the fire hydrant and valve. The T-turnaround shall slope 1 inch per foot ("/ft) to the curb. If a T-turnaround is required on a berm and ditch street, a ¼ inch per foot ("/ft) slope away from the street and a culvert placed in the ditch line shall be required.

SECTION 207 CURB AND GUTTER

A) For proposed subdivisions where the average lot frontage is greater than 150 feet, curb or curb and gutter may be required by the Village of Mt. Orab Engineer for, but not limited to, the following:

1) Storm water management concerns,
2) Pavement edge stabilization,
3) Parking area delineation,
4) Storm water routing to drainage inlets,
5) At intersections, corners, and tight radii

B) Local (Urban) and Commercial/Industrial Streets shall utilize the Village of Mt. Orab Standard Curb – see reference drawing STD0005.

C) Collector (Urban) Streets shall utilize ODOT Type 2 Combination Curb and Gutter– see ODOT BP-5.1.

D) Curb and gutter shall be poured on top of an approved 6 inch 304 aggregate base when using the aggregate base typical section alternative(s), however, the curb and gutter shall be poured directly on top of an approved subgrade when using the full depth asphalt typical sections. See reference drawing STD06 for

underdrain details when using the aggregate base typical section.

E) The curb may be hand formed or poured using a slip form machine. When slip forming is used, the curb string must be checked for line and grade by the inspector prior to pouring.

F) Use of a 1-inch diameter × 18-inch dowel bars, as well as, 1 inch expansion material are required at the beginning and end of each radius, at all cold joints, and 3 feet from each catch basin. Greased caps are required on the dowel bars per ODOT BP-2.2.

G) A 2-inch deep tool joint is to be cut into the curb every 10 feet. A broom finish running perpendicular to the curb is also required.

H) Curb must cure for 7 days before base or backfill can be placed against it.

I) When a curb and gutter street connects with a berm and ditch street, a curb transition is to be used

SECTION 208 TYPICAL SECTIONS

A) Urban Street Sections (with curb and gutter)

1) Class I local streets shall have a pavement build-up as shown in the Typical Sections section included with this document. The increased pavement section will accommodate increased construction traffic. The Village of Mt. Orab Engineer shall determine the classification of local streets based on the proposed subdivision layout and expected construction travel patterns. A "spine" road through a proposed subdivision would be an example of a Class I Local Street.

2) Class II local streets shall have a pavement build-up as shown in the Typical Sections section included as a part of this document.

3) The back-to-back of curb width for both Class I and Class II local streets shall be determined by the table included in Section 504 B.2. of the Village of Mt. Orab Subdivision Regulations.

4) Collector Streets – Urban shall have a pavement build-up and width as shown in the Typical Sections.

5) Local streets in proposed Commercial and Industrial subdivisions shall have a pavement build-up and width as shown in the Typical Sections.

B) Rural Street Sections (without curb and gutter)

1) See Typical Sections for details.

C) Rural Street Sections for Large Lot Subdivisions (Article VII, *Village of Mt. Orab Subdivision Regulations*)

1) Shall adhere to the Rural Street Typical Section detail.

2) Shall be a minimum of 18 feet edge of pavement to edge of pavement.

SECTION 209 SIGNS

A) Signs shall conform to and be placed in accordance with the Ohio Manual of Uniform Traffic Control Devices.

B) Stop signs and street name signs must be erected prior to any residential/commercial construction.

C) The developer is responsible to install all stop signs and street name signs (reference drawings STD07, STD08) on newly constructed roads.

D) The stop signs are to be 30 inch × 30 inch reflectorized metal signs mounted 7 feet high from the ground to the bottom of the sign. The post is to be set 4 feet off the side curb or edge of pavement and 6 feet to 12 feet off the intersecting street curb or edge of pavement.

E) Street name signs are to be 11 feet high from the ground to the bottom of the sign with four (4) inch white letters on a green reflective backing. Street name signs may be mounted on stop sign posts but must be a minimum of 18 inches above the top of the stop sign.

SECTION 210 CUL-DE-SACS & KNUCKLES

A) The design and improvement standards for cul-de-sacs (reference drawing STD09) are suggested minimums for all residential subdivision streets. Top of curb elevations shall be indicated on construction plans at beginning point of the curve (P.C.), point of return curve (P.R.C.), point of tangent (P.T.), at the center, as well as, at every 30° point around the cul-de-sac.

B) Knuckles may be used to turn a street 90° and have the same minimum radius requirements as the cul-de-sac. Even though it turns 90°, it is the same street and does not change street names nor does it need a stop sign.

SECTION 211 SURVEY MONUMENTS

Iron Pin Monuments shall be set at all outside corners of the Parent Tract. Railroad spikes or 2 ½" mag nails shall be set at all centerline intersections, center of all cul-de-sacs and the PC's and PT's of all curves for all streets, alleys, private streets, and common driveways. For corners, reinforcing bars of 5/8" x 30" with caps identifying the registration number of the surveyor are acceptable. All surveys performed in Village of Mt. Orab for new Subdivision Plats requiring the construction of new public streets, private streets or creation of new easements of access shall be required to tie into a minimum of two (2) Village of Mt. Orab Survey Monuments. At least two (2) coordinates of the survey shall be tied to the State Plane Coordinate System. The traverse of the exterior boundaries of the tract of each block, when computed from field measurements of the ground, shall close within a limit of error of one foot to ten thousand (10,000) feet of the perimeter before balancing the survey.

SECTION 212 EROSION AND SEDIMENT CONTROL

The Village of Mt. Orab Building Department shall enforce the most current edition of the "Village of Mt. Orab Storm Water management and Sediment Control Regulations" currently administered by the Village of Mt. Orab Building Department.

SECTION 213 STORMWATER CONVEYANCE SYSTEMS

A) GENERAL- All subdivisions shall provide a storm water conveyance system to adequately handle storm water runoff from the entire area being platted and all off-site flows through the platted area, designed according to the design standards contained in this section and in the Village of Mt. Orab Water Management and Sediment Control Regulations. These specifications shall govern all drainage systems and appurtenances within the existing or proposed public right-of-way and those facilities outside the proposed right-of-way, being within a storm sewer easement, required for drainage purposes.

1) The system shall be compatible with systems of all adjacent properties and ~~by being~~ sized to accommodate runoff from all areas upstream, as well as considering the effects of discharge from the

site to downstream areas.

2) In all cases, the conveyance system shall have a clear, unobstructed outlet, and discharge into a channel, watercourse, or closed conduit system capable of handling the design flow at the expected velocity without causing erosion or damage to the receiving system.

3) All storm water conveyance systems must adequately provide for flood routing to pass the 100 year storm event.

4) Other improvements may be required to provide adequate hydraulic characteristics of existing watercourses within the existing or proposed public right-of-way, such as removal of obstructions, channel clearing, widening, or bank stabilization.

B) HYDROLOGY - Storm runoff volumes may be calculated using the following techniques:

1) Rational Method for drainage areas of 50 acres and less. (refer to Appendix A – Water Management and Sediment Control (WMSC) Regulations for additional design parameters.)

2) The Soil Conservation Service (SCS) TR55 Method shall be used for drainage areas greater than 50 acres.

3) Additionally, USGS regression equations (89-4126, Bulletin 45 or 93-135 for rural and urban streams respectively) shall be used for the design of culverts, bridges, and large storm sewers.

C) OPEN CHANNEL (ditch, swale) DESIGN

1) Ditches shall be designed and constructed to adequately handle the discharge and velocities expected from a 10-year frequency (post development) storm event, for tributary drainage areas less than 25 acres. A 25-year frequency (post development) storm event shall be used for drainage areas of 25 acres or greater.

2) The following manning coefficients shall be used in the Manning's Formula for open channel design:

i) Sod	0.05
ii) Paved Lining	0.015
iii) Rock Channel Protection	0.08
iv) Some grass and weeds	0.030 – 0.035
v) Some weeds and light brush	0.035 – 0.050
vi) Some weeds and heavy brush	0.05 – 0.07
vii) Trees in channel	add .01 to .02 to all above

3) Ditches shall be designed with maximum side slopes of 3:1, with a minimum 4' rounded bottom.

4) All roadway ditches (reference drawing STD10) shall be designed with a depth of flow not to exceed 18 inches. If the depth of flow exceeds this amount, inlets shall be provided to intercept sufficient flow to maintain a depth of less than 18" in the downstream ditch.

5) The minimum grade for swales and ditches shall be 1.0%. Low flow conditions must be addressed to prevent stagnation. The minimum ditch velocity (for normal flow conditions) shall not be less than 1.5 fps. Perforated underdrains or french drains may be required if minimum grade or velocity cannot be achieved.

6) The maximum grade for swales and ditches shall be determined by the velocity at design conditions.

   i) Ditches and swales shall be lined with vegetation or other material to provide stable side slopes and bottom. Ditches with design velocities less than 6 feet per second shall have vegetative cover.

ii) Staked sod bottoms with seeded and mulched side slopes shall be provided for design velocities between 4 and 6 fps.

iii) Design velocities in excess of 6 feet per second, shall require channel protection with rock channel protection (rip-rap), paved inverts, or other approved method.

iv) Open channels shall also be provided with rock channel protection at all pipe or culvert inlets and outfalls. Rock channel protection at pipe inlets or outlets shall be designed according to Appendix C, Exhibit IV in the Village of Mt. Orab Water Management and Sediment Control Regulations.

7) If existing soils are incapable of supporting vegetative growth, they shall be modified to a condition capable of supporting seed or sod, or a suitable soil added as top dressing. Sod and seeded areas shall be maintained, and reinstalled if necessary, until established.

D) STORM SEWERS

1) GENERAL

i) Minimum Time of Concentration shall be 10 minutes for catch basins.

ii) All storm sewer conduits shall be designed for a 10-year post-development storm event using Manning's equation for full-flow conditions using a Manning's roughness coefficient ("n" value) of 0.015 for plastic, concrete, or non-ribbed metal pipes and suggested manufacturers standard for corrugated metal pipes.

iii) The storm sewer system shall be checked by determining the hydraulic gradient based on a 25-year post-development storm.

iv) Minimum storm sewer diameter shall be 12 inches.

v) Allowable velocities of storm sewers shall be greater than 2.5 fps and less than 12 fps. Key block anchors shall be provided every 20 feet if velocities exceed this maximum. The system should be designed to avoid large differences in velocities between consecutive reaches.

vi) The minimum grade is to be 0.40%. Any storm run with a grade of over 12% shall have key block anchors every 20 feet.

vii) The invert of the first storm sewer structure upstream of an outfall structure shall be above the 25-year flood elevation of the receiving watershed. Where a storm pipe outlets into a pond or lake, the invert of the pipe shall be no lower than the normal pool level of the pond or lake.

2) MATERIAL

i) All pipes used in the storm sewer system shall have watertight joints.

ii) The following types of pipes shall be permitted:

(1) Class IV Reinforced Concrete Pipe – All available sizes 12 inches and over are acceptable. Joints shall be coated with tar and after they are fitted together, the top half of the pipe joint is to be coated with tar. The minimum allowable cover over the bell of the pipe is 3 inches.

(2) Aluminized Metal Pipe – All available sizes 12 inches and over are acceptable. The County Engineer's Office reserves the right to disallow metal pipe in high acidic areas (such as near farm animal waste, septic systems, or soils with high acid content). The minimum allowable cover over the pipe is 6 inches.

(3) Polyvinyl Chloride Plastic (PVC) Pipe – Pipe sizes shall be permitted as per current Ohio Department of Transportation specifications. The minimum cover for this pipe is 12 inches and the maximum cover is 40 feet.

(4) Corugated Polyethylene (HDPE) Smooth Lined Pipe – Pipe sizes shall be permitted as per current Ohio Department of Transportation specifications. The minimum cover for this pipe is 12 inches and the maximum cover is 25 feet.

3) BEDDING AND BACKFILL

i) Bedding and backfill requirements for storm sewer conduit shall be governed by Item 603 of the ODOT Construction and Material Specifications.

ii) All storm runs using more than one length of pipe are to be installed using a pipe laser to ensure proper line and grade.

iii) See Section 218 and Trench Backfill details (STD11-STD13) for backfill requirements for construction within an existing public street or road right-of-way.

E) MANHOLES – Shall conform to The Ohio Department of Transportation – Standard Construction Drawings and are required as follows:

1) Sewer intersections and termini.

2) Changes in sewer size alignment, and slope.

3) As required for maintenance, with a maximum distance between structures of 400 feet.

F) CATCH BASINS – Shall conform to The Ohio Department of Transportation – Standard Construction Drawings and are required as follows:

1) Shall be spaced to accommodate the tributary flow to that inlet taking into account by-pass flow and inlet capacity and shall not exceed 350 feet. Special grates may be required to increase inlet capacity on streets with steep gradients.

2) Shall be located upstream of street intersections, crosswalks, and driveways.

3) ODOT CB-3's shall be required at all low points and sag curves.

4) The Village of Mt. Orab Engineer recommends the use of CB-3 catch basins. When desired, CB-3A catch basins shall be limited to small drainage areas with an expected flow of approximately one (1.5) cfs. The Village of Mt. Orab Engineer reserves the right to require CB-3 catch basins in-lieu of CB-3A's.

5) Shall have bicycle-safe grates.

6) Shall have a minimum depth of 3 feet.

7) Shall have a minimum sump depth of 6" as a grit trap.

8) Village of Mt. Orab requires the use of a modified Catch Basin – see reference drawings STD14 and STD15 for details.

9) Shall display a permanently cast/engraved message and/or logo discouraging anyone from dumping into the inlet. (reference drawing STD16)

G) HEADWALLS – Shall conform to The Ohio Department of Transportation – Standard Construction Drawings and are required as follows:

1) At the outfall of all storm sewers. See reference drawings STD17 – STD19 for details.

2) At all culvert inlets and outlets. Dependent upon culvert size, proposed grading, existing topography, and stream characteristics, the County Engineer may request wing walls to complement the standard headwall.

3) May require grating as a safety feature if the maximum headwater depth exceeds 3 feet.

4) Shall be located above the flood elevation of the design year storm within floodplains or watersheds subjected to frequent floods or backwater.

5) All pipes at ditch inlets and that outlet to an open channel shall be installed with an approved headwall, including appropriate inlet or outlet protection.

H) INLETS - Shall conform to The Ohio Department of Transportation – Standard Construction Drawings

See reference drawings STD20 – STD23 for construction details.

I) CULVERTS

1) Culverts shall be designed according to methods outlined in the current version of the "Manual of Location and Design, Vol. 2", published by the Ohio Department of Transportation.

2) By definition, the maximum span for a culvert shall be restricted to less than 10 feet. Structures having a span greater than ten feet shall be considered bridges.

3) Culverts shall be designed and constructed to adequately handle the discharge and velocities expected from a 25-year frequency storm event, for tributary drainage areas less than 50 acres. A 50-year frequency storm event shall be the design criteria for tributary drainage areas of 50 acres or greater. However, the County Engineer reserves the right to apply stricter design standards based on the flooding potential of the proposed culvert.

4) The designer shall determine the elevation of the 100 year storm event and, as determined by the Village Engineer, include backwater analysis calculations for upstream development.

5) Flood routing and emergency overflow paths for the 100 year storm event must be provided and detailed by the designer in the event of a storm event greater than the design storm.

6) Calculations shall indicate whether culvert flow is governed by inlet or outlet conditions. Inlet and outlet volumes and velocities shall be provided.

7) Headwater depths shall not be higher than 1 foot below the lowest point of the road nor 18 inches below the top of curb above the culvert.

8) Rock channel protection shall be provided at culvert inlets and outlets as per the ODOT Location and Design Manual.

SECTION 214 BRIDGES

A) All structures having a span greater than or equal to 10'-0" shall be considered bridges and designed appropriately. The following factors will be considered when selecting the type, size, and location of bridge structures:

1) Stream hydraulics and flow characteristics.

2) Geotechnical investigations shall be required for each bridge location.

3) Channel characteristics such as slope, bed, and size upstream and downstream of the proposed bridge location.

4) The structure must be designed to pass the flow from the 100 year post-development storm event and provide emergency overflow/flood routing.

5) A backwater analysis may be requested by the County Engineer's office for areas susceptible to flooding as a result of the structure and/or road embankment.

6) The designer shall provide the County Engineer with detailed structural drawings and calculations for review and approval prior to construction.

SECTION 215 OFF-SITE IMPROVEMENTS

A) **ROAD WIDENING –** If a traffic impact study determines that a new development may adversely impact an existing road and/or intersection, a turn lane or road improvement may be required. Plan Improvements to existing County Roads shall be prepared per the following guidelines:

1) Typical Section showing widening, pavement build-up, and berm/ditch details.

2) Plan/Profile Sheets at a horizontal scale of 1"=20'-0" and a vertical scale of 1"=5'-0".

3) Cross sections at 50'-0" intervals, with additional sections taken at critical locations.

4) Intersection Details

5) Pavement Marking Plan

6) Drainage details including culvert profiles.

The Village of Mt. Orab Engineer's Office has specific details for residential, commercial, and subdivision entrances onto existing County or Township roads. Please refer to reference drawings STD24 – STD26 for further details.

SECTION 216 GUARDRAIL

This item consists of placing Steel Beam ODOT Types 4, 5, 5-A and Type 5 w/ tubular backup guardrail at such places where the roadway embankment areas are more than 5 feet deep and/or with steeper than 4:1 slopes. Type B anchor assembly with flares shall be used unless otherwise stated (reference drawing STD27).

SECTION 217 ROAD DITCH AND BERMS

See Standard Drawing STD10.

SECTION 218 BACKFILL AND TRENCH DETAILS

A) **GENERAL** - Refer to Standard Drawings STD11 through STD13 for trench backfill requirements for construction occurring within the right-of-way of a public street

1) STD11should be used when the trench limits for proposed utility construction does not **fall** within three (3) feet of the existing edge of pavement.

2) STD12 should be used when the trench limits for proposed utility construction **falls** within three (3) feet of the existing edge of pavement.

3) STD13 should be used when the trench limits for proposed utility construction falls within the existing pavement and requires the excavation or removal of the existing road base and pavement.

4) Controlled Density Fill (CDF) – This item shall conform to ODOT's low strength mortar backfill specification and/or HAM/CIN CLSM Specification or an approved equal. CDF is required when repairs effect the roadway surface course (existing/final pavement) or when the final surface course is to be placed within 30 days.

SECTION 219 – TRAFFIC CALMING

A) Traffic calming techniques may be utilized with prior written approval from the Village of Mt. Orab Planning Commission and the Village of Mt. Orab Engineer.

SECTION 220 INCIDENTAL CONSTRUCTION

A) **CONCRETE** – All concrete shall be Class "C" in accordance with ODOT Item 609.02. The minimum air temperature for concrete poured at ground level (sidewalk, apron, and curb) is to be 32°F. Concrete may not be poured on frozen base or subgrade. Concrete must be protected from freezing for 7 days after pouring. No more than 1.5-% calcium may be added to accelerate setup time. Curing compound is to applied at 1 gallon /150 sq. ft. The class "C" mixed concrete must obtain a minimum strength of 4000 lbs. per sq. inch after 28 days using compression test. Concrete testing will be the responsibility of the Village of Mt. Orab Engineer's Office.

B) **ENTRANCE ISLANDS** - Entrance islands may be permitted with written approval from the township. A landscaping plan must be submitted and documentation on whom is responsible for maintenance.

C) HANDICAP RAMPS -Handicap ramps are required on all curb and gutter streets with sidewalks and shall conform to ODOT's Standard Construction Drawings.

D) **DRIVEWAY APRONS** - The driveway apron refers to the section of driveway that is located within the Public Right-of-Way. (reference drawing STD01 - 02 and STD24 – STD26).

E) Rock Channel Protection shall be provided at all storm sewer outfalls and shall be installed in conformance with the ODOT Location and Design Manual – Volumes I and II.

F) MANHOLES

1) Storm manholes are to be a minimum of 4 feet inside diameter (pipe size or number of pipes may require a larger diameter).

2) The base may be precast, poured or bricked as per ODOT STANDARD DRAWINGS.

3) Steps are required when the manhole is 4 feet or deeper.

4) To reduce settlement, all manholes in the pavement or within 5 feet of the pavement are to be backfilled with Class "B" fill. All drop manholes are to be backfilled with Class "B" fill under and over the drop.

5) The casting elevation can be raised a maximum of 2 feet using donut risers.

G) **CATCH BASINS & INLETS**

1) **GENERAL -** For the sake of clarity in these regulations, a "catchbasin" is considered to be in the street and an "inlet" is considered to be outside of the street. The catch basins may be precast or bricked as per ODOT's STANDARD CONSTRUCTION DRAWAINGS. Modified CB -3 (double) and modified CB-3A (single) catch basins are required.

2) **BRICKED -** All bricked catch basins and inlets must be plastered on the inside. They are to be built on a 6 inches thick concrete base (Class "C" concrete). The maximum depth of a double catch basin is to be 5 feet. The maximum depth of a single catch basin is 4 feet.

3) **PRECAST –** All precast catch basins and inlets must have tongue and groove connecting sections to eliminate shifting. The maximum depth of a 24-inch inlet is 4 feet. The maximum depth of a 36 inch to 74 inch inlet is 10 feet with steps required over 4 feet. Any depth over 10 feet will require a manhole. Inlet grates must be bolted down to discourage vandalism and for homeowner safety.

H) **LANDSCAPING**

1) Trees, landscape rocks, shrubs, and any other item that could be considered a traffic hazard or might restrict site distance will not be permitted in the right of way unless prior written permission is obtained and a landscaping plan is **approved by the Village Zoning Department and/or Village Engineer**.

2) It is the developer's responsibility to keep the right of way free of obstructions during the bond period.

3) When a subdivision has frontage on a county road, all trees and stumps are to be removed from the right of way.

I) **SUMP PUMP COLLECTOR LINE**

1) A collector line (reference drawing STD0028) is an underground line designed to convey sump drainage to a catch basin or storm manhole.

2) They are to be PVC SDR 35, 6-inch pipe. As shown in STD0028, the sump line connection from the house to the sump pump collector line shall be completed by the builder and inspected by the Village of Mt. Orab Utility Department. Point of connection shall be at the top of a storm structure or as approved by the Village.

3) Refer to the Typical Section(s) for sump line location and depth requirements.

4) Downspouts shall not be connected to the sump line. Downspout drainage shall be accomplished as permitted by the Village of Mt. Orab Building Department.

J) **PAVEMENT MARKINGS**

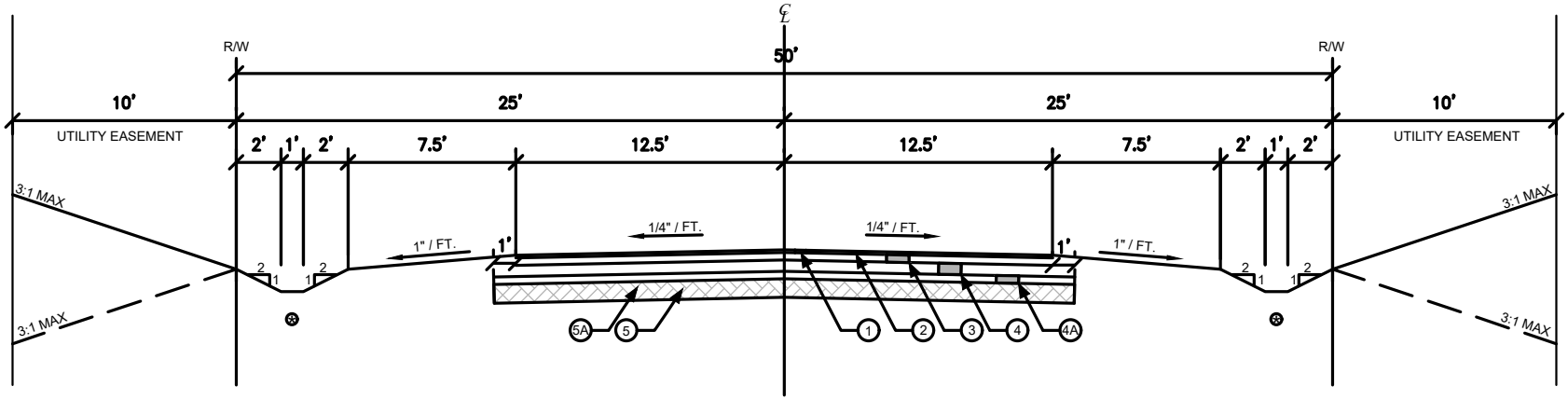
1) When pavement markings are required, it shall be the responsibility of the developer to complete.

2) Pavement markings are required for turn lanes and for a street 33 feet or wider (commercial street width).

3) All permanent pavement markings shall conform to Ohio Department of Transportation, Construction & Material Specification for Item 644 - Thermoplastic Pavement Marking.

ARTICLE 3

TYPICAL STREET SECTIONS

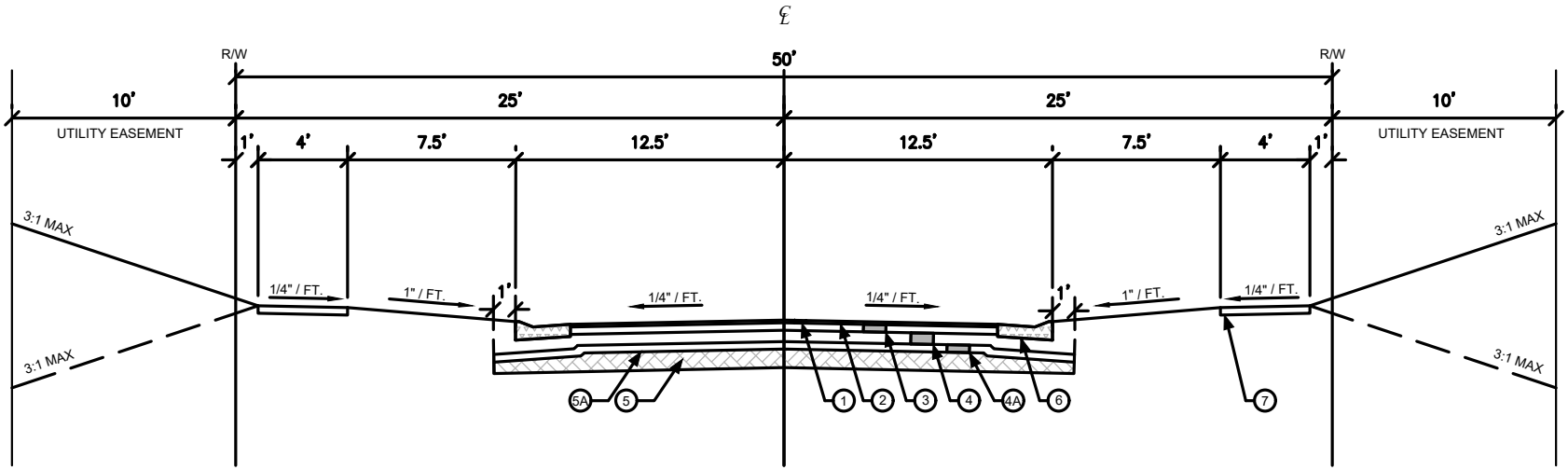


*NOTE:
UNDERDRAIN AT BOTTOM OF SWALE IS REQUIRED IF OUTFALL/VERTICAL RELIEF IS AVAILABLE.

1	1 1/2" (COMPACTED) SURFACE COURSE
2	TACK COAT
3	4" ODOT ITEM 302 ASPHALT BASE COURSE
4	6" ODOT ITEM 304
4A	4" ODOT ITEM 305 WITH 5A
5	SUBGRADE
5A	LIME STABILIZED SUBGRADE

TYPICAL SECTION
LOCAL / DEAD END / CUL-DE-SAC
RURAL

NOT TO SCALE

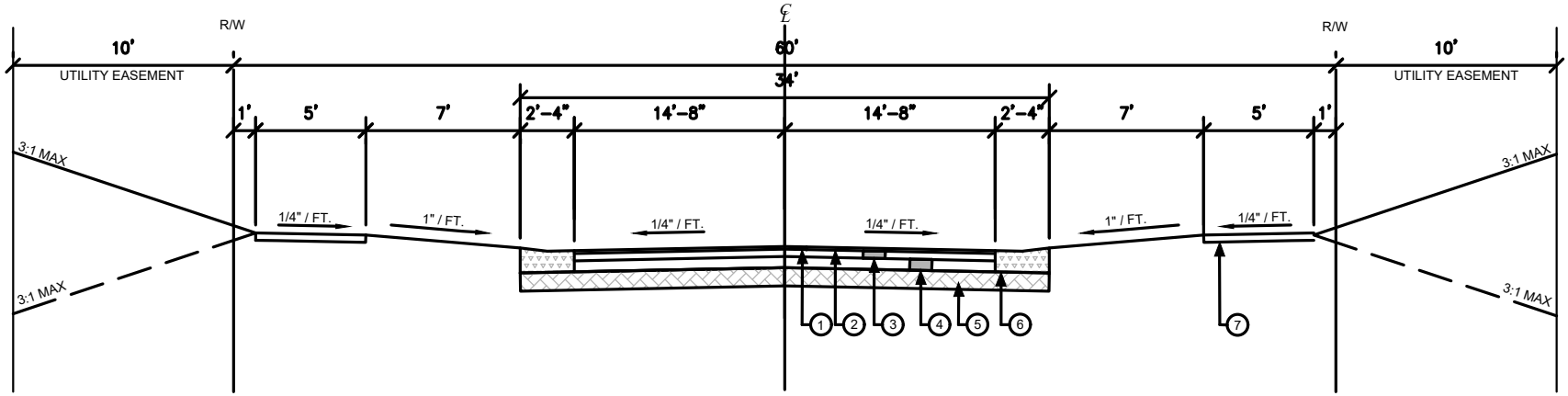


*NOTE:
UNDERDRAINS ARE TO BE INSTALLED AT ALL DESIGN LOW POINTS WITHIN THE PAVEMENT.

1	1 1/2" (COMPACTED) SURFACE COURSE
2	TACK COAT
3	4" ODOT ITEM 302 ASPHALT BASE COURSE
4	6" ODOT ITEM 304
4A	4" ODOT ITEM 305 WITH 5A
5	SUBGRADE
5A	LIME STABILIZED SUBGRADE
6	CURB AND GUTTER, PER VILLAGE DETAIL
7	ITEM 608 CONCRETE WALK, 4" THICK, CLASS C

TYPICAL SECTION
LOCAL / DEAD END / CUL-DE-SAC
URBAN

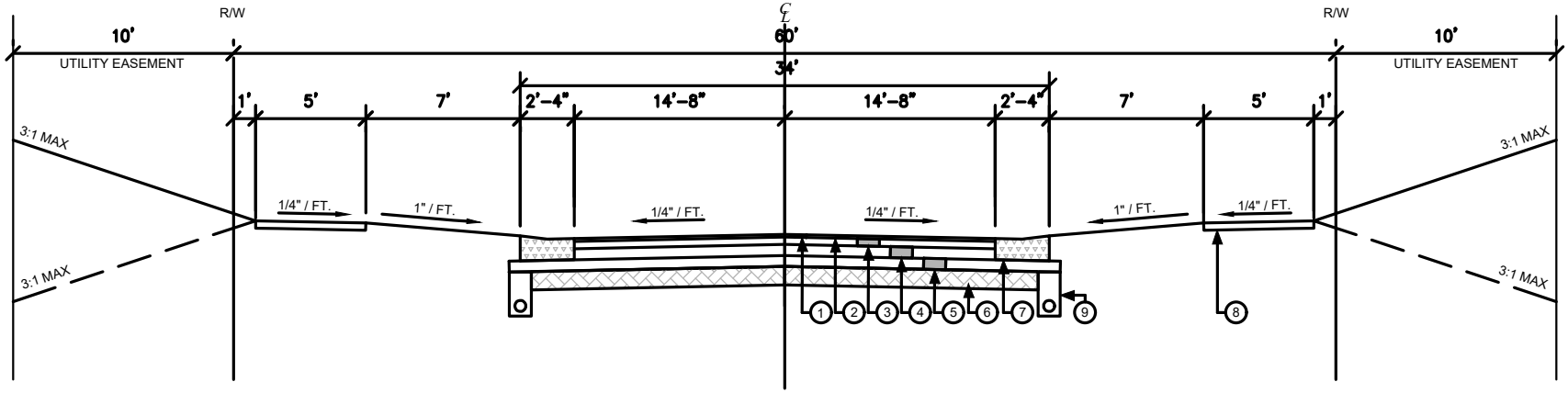
NOT TO SCALE



1. ITEM 448 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG54-22
2. ITEM 407 TACK COAT (APPLICATION RATE OF 0.1 GAL/SQ. YD.)
3. ITEM 448 2 3/4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG54-22
4. ITEM 301 8" ASPHALT CONCRETE BASE COURSE
5. COMPACTED SUBGRADE
6. CURB AND GUTTER, PER VILLAGE DETAIL
7. ITEM 608 CONCRETE WALK, 4" THICK, CLASS C

TYPICAL SECTION
COMMERCIAL / INDUSTRIAL
FULL DEPTH ASPHALT

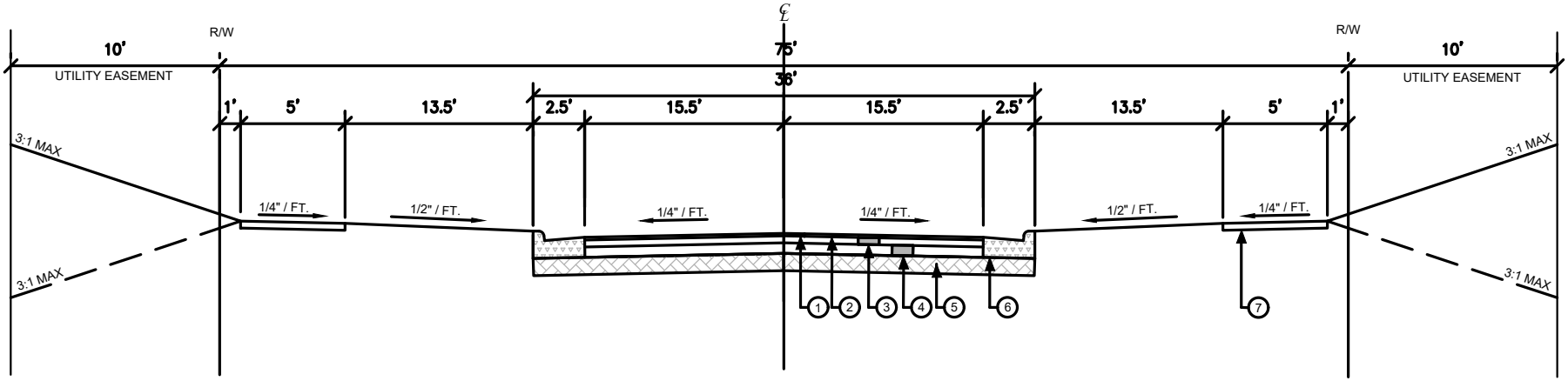
NOT TO SCALE



1. ITEM 448 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG54-22
2. ITEM 407 TACK COAT (APPLICATION RATE OF 0.1 GAL/SQ. YD.)
3. ITEM 448 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG54-22
4. ITEM 301 6" ASPHALT CONCRETE BASE COURSE
5. ITEM 304 6" AGGREGATE BASE W/UNDERDRAIN
6. COMPACTED SUBGRADE
7. CURB AND GUTTER, PER VILLAGE DETAIL
8. ITEM 608 CONCRETE WALK, 4" THICK, CLASS C
9. SEE VILLAGE DETAIL STD0006

TYPICAL SECTION
COMMERCIAL / INDUSTRIAL
AGGREGATE BASE

NOT TO SCALE



*NOTE:
UNDERDRAINS ARE TO BE INSTALLED AT ALL DESIGN LOW POINTS WITHIN THE PAVEMENT.

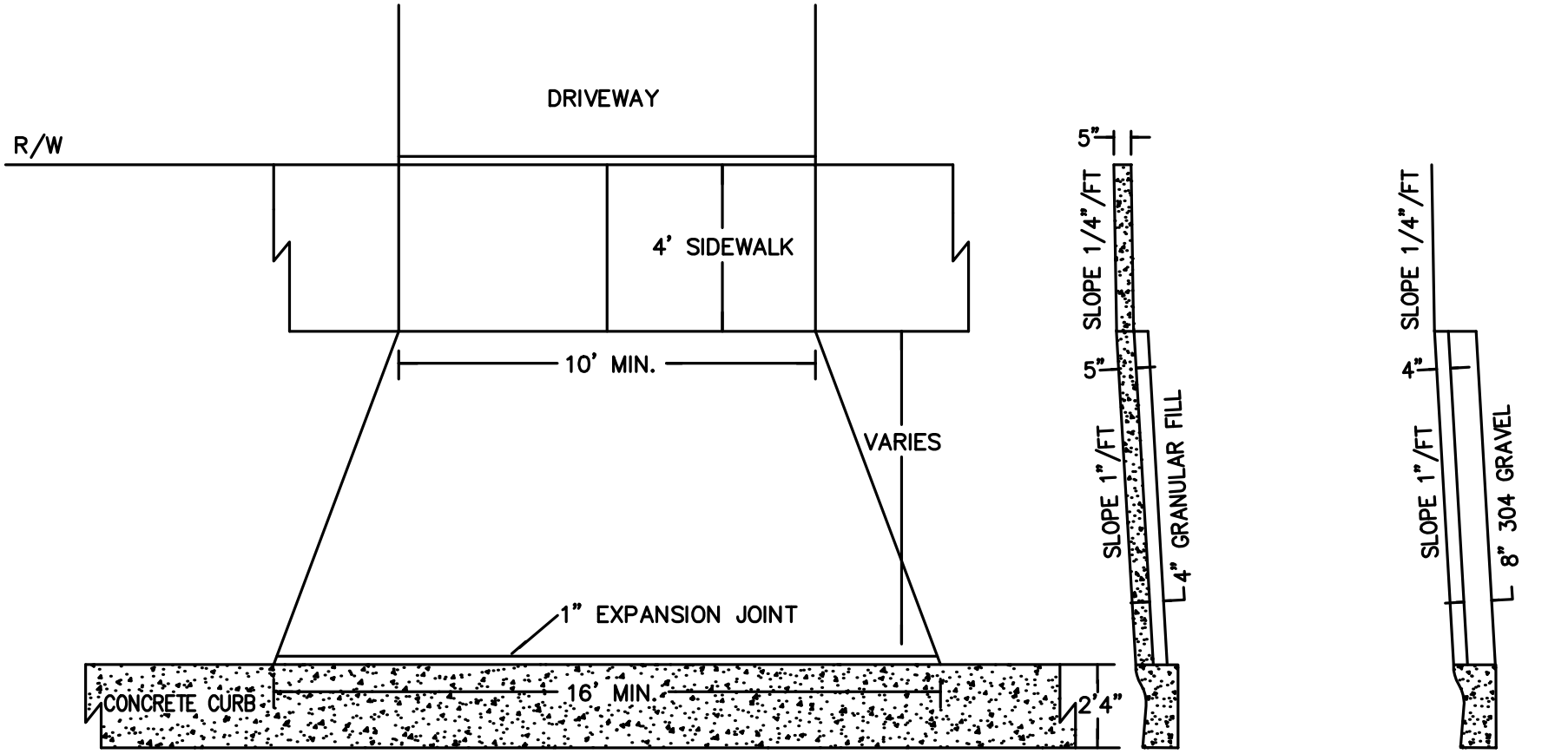
1. ITEM 448 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG54-22
2. ITEM 407 TACK COAT (APPLICATION RATE OF 0.1 GAL/SQ. YD.)
3. ITEM 448 2 3/4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG54-22
4. ITEM 301 8" ASPHALT CONCRETE BASE COURSE
5. COMPACTED SUBGRADE
6. ITEM 609 ODOT TYPE 2 CURB & GUTTER
7. ITEM 608 CONCRETE WALK, 4" THICK, CLASS C

TYPICAL SECTION
COLLECTOR - URBAN

NOT TO SCALE

ARTICLE 4

STANDARD DRAWINGS



CONCRETE

5" OF CLASS "C" CONCRETE
4" OF GRANULAR FILL

* MUST BE USED IF SIDEWALKS ARE USED

ASPHALT

4" OF 404 ASPHALT (2 LIFTS)
8" OF 304 GRAVEL (2 LIFTS)

SIDEWALK AND DRIVEWAY APRON (1 OF 2)

SCALE : 1" = 4'

STD0001

1. ALL PUBLIC SIDEWALK AND DRIVEWAY SHALL BE CONSTRUCTED OF CLASS "C" CONCRETE.

2. THE PREFERRED SUBGRADE IS DRY COMPACTED CLAY. ALL FORMED AREAS WILL BE FREE OF STANDING WATER, MUD, OTHER FOREIGN DEBRIS AND NO CONCRETE SHALL BE POURED ON FROZEN SUBGRADE. CONCRETE CAN ONLY BE POURED AT AN AIR TEMPERATURE OF THIRTY–TWO DEGREES AND RISING (32 F). STANDARD FORMS OF PROTECTION WILL BE REQUIRED TO PREVENT CONCRETE FROM BEING DAMAGED BY HEAT, FREEZING, AND INCLEMENT WEATHER CONDITIONS. A MAXIMUM FOUR INCH LIFT OF CLASS "B" GRANULAR MATERIAL WILL BE ALLOWED IN MOST CASES. LIFTS REQUIRING MORE THAN FOUR INCHES OF FILL WILL REQUIRE COMPACTED 304 LIMESTONE AS FILL MATERIAL TO BRING FORMED AREAS TO PROPER SUBGRADE ELEVATION.

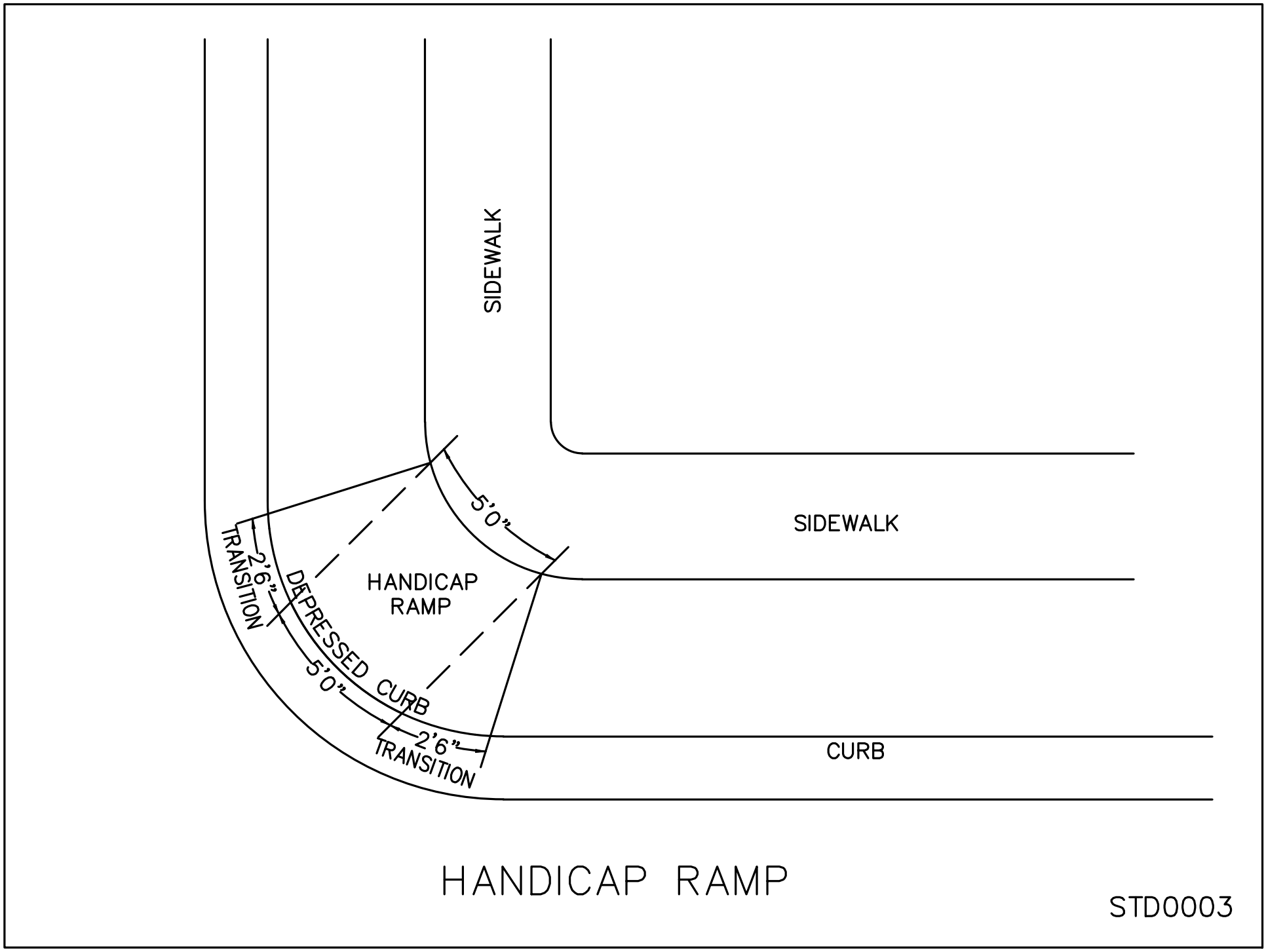
3. SIDEWALK FORMWORK WILL BE CONSTRUCTED IN A FOUR FOOT WIDTH HAVING A DEPTH OF FIVE INCHES, AND TOOL JOINTS EVERY FIVE FEET. THE SIDEWALK'S SURFACE SHALL HAVE EITHER A BROOMED OR TROWELED FINISH. THE SLOPE OF THE SIDEWALK WILL FALL TOWARD THE ROAD AT THE RATIO OF ONE–QUARTER INCH PER ONE FOOT. EXPANSION JOINTS WILL BE REQUIRED AT ALL COLD JOINTS UTILIZING ONE–HALF INCH ELASTIC MATERIAL. ALL FORMWORK WILL USE STEEL OR WOODEN FORMS THAT WILL SUPPORT FIVE INCHES OF CONCRETE WITH NO RUN OUT.

4. DRIVEWAY APRONS WILL BE CONSTUCTED AT A MINIMUM OF SIXTEEN FEET IN WIDTH AT THE STREET INCLUDING TWO ENTRANCE WINGS. WING WIDTH WILL BE THREE FEET AND ITS LENGTH WILL EXTEND FROM BACK OF CURB TO SIDEWALK OR FROM BACK OF CURB TO THE PUBLIC UTILITY EASEMENT. THE APRON'S DEPTH WILL BE FIVE INCHES THROUGHOUT THE FORMED AREA. THE APRON'S LENGTH IS DETERMINED BY ITS ROAD WIDTH (SEE DETAILS). SLOPE OF THE APRON WILL FALL TOWARD THE ROAD AT THE RATIO ONE INCH PER FOOT. AN EXPANSION JOINT OF ELASTIC ONE INCH MATERIAL WILL BE REQUIRED AT THE CURBLINE.

SIDEWALK AND DRIVEWAY APRON (2 OF 2)

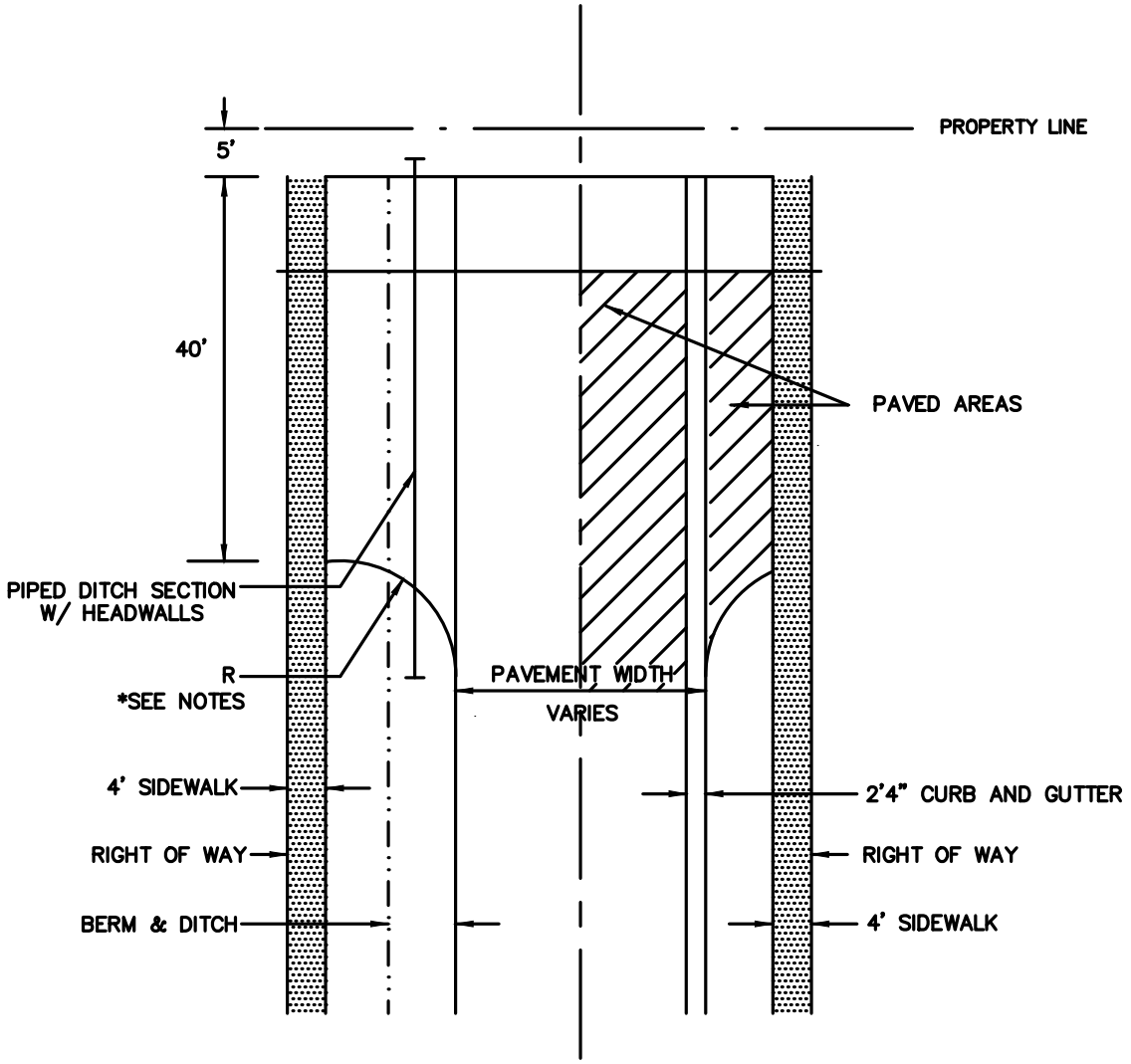
SCALE : 1" = 6'–0"

STD0002



HANDICAP RAMP

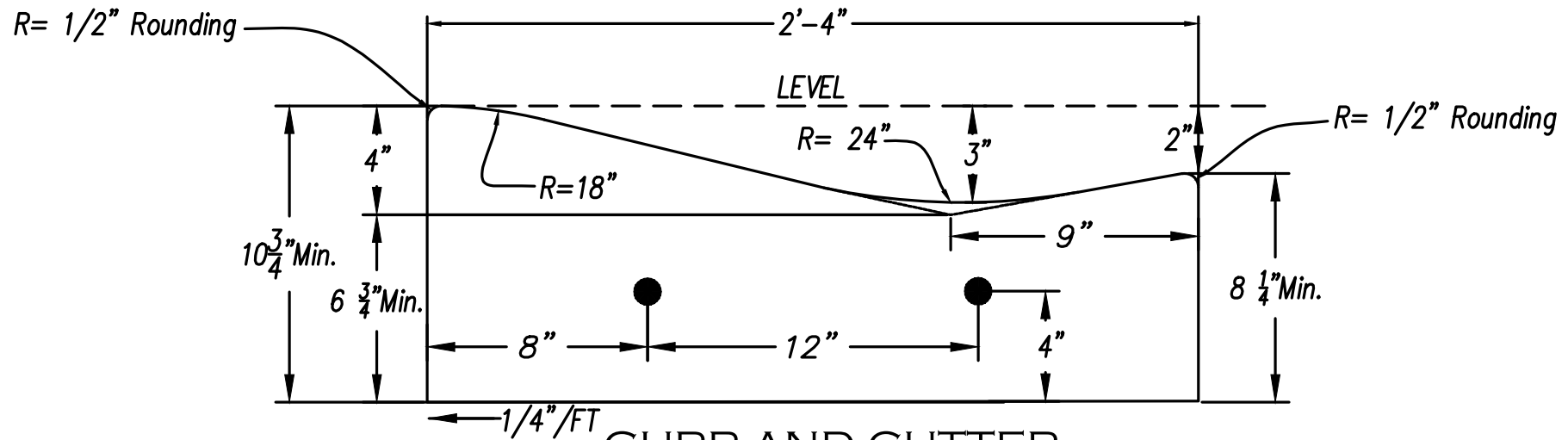
STD0003



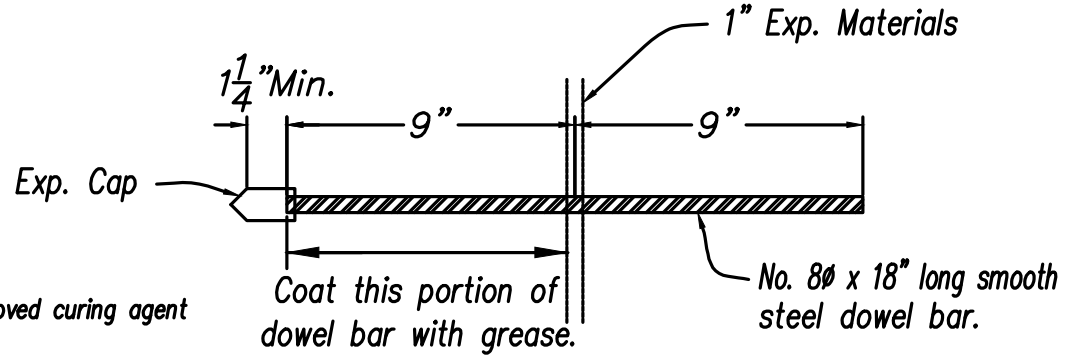
NOTES:
1. WHERE CURB & GUTTER IS REQUIRED, CURB & GUTTER SHALL BE CONSTRUCTED THROUGH THE TURN AROUND.
2. WHERE SIDEWALK IS REQUIRED, SIDEWALK SHALL BE CONSTRUCTED THROUGH THE TURN AROUND AT THE PROPER GRADE ABOVE THE BACK OF THE CURB.
3. THE "T" TURN AROUND SHALL BE BE CONSTRUCTED TO THE R.O.W. W/OPEN DRAINAGE SWALE, OR TO SIDEWALK IF SIDEWALKS ARE USED.
4. PAVED AREA SHOULD REFLECT SAME PAVEMENT STRUCTURE AS ROADWAY.
5. *THE RADIUS "R" SHALL BE THE DISTANCE BETWEEN THE CURB AND R.O.W. LINE.
6. SIDEWALK IN THE T-TURN AROUND WILL BE 5" THICK.

"T" TURN AROUND

STD0004



CURB AND GUTTER



DOWEL BAR DETAIL

NOTES

(1) Concrete for curbs and gutters shall be ODOT Class "C", an approved curing agent shall be applied after finishing.

(2) Two smooth steel dowel bars, No. 8, x 18 inches long, with expansion caps shall be installed at each expansion joint as shown on the detail.

(5) All joints shall be vertical and either perpendicular or radial to the back of the curb.

(6) All exposed edges shall be rounded to 1/2" radius.

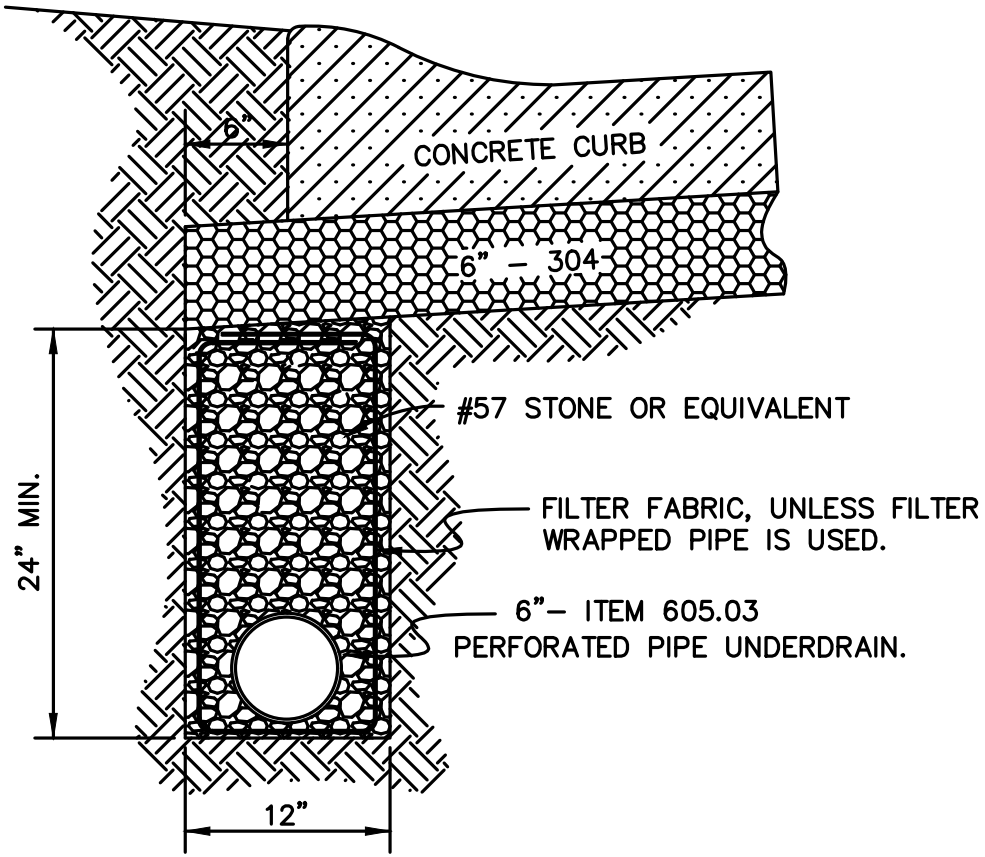
(7) All curbing shall be backfilled before pavement work is begun.

(8) Requirements as shown with expansion joints at radii and inlets, impressed contraction joints at 10' spacing between expansion joints.

(9) See ODOT Standard Construction Drawing BP2.2 for additional details.

STANDARD CURB

STD0005

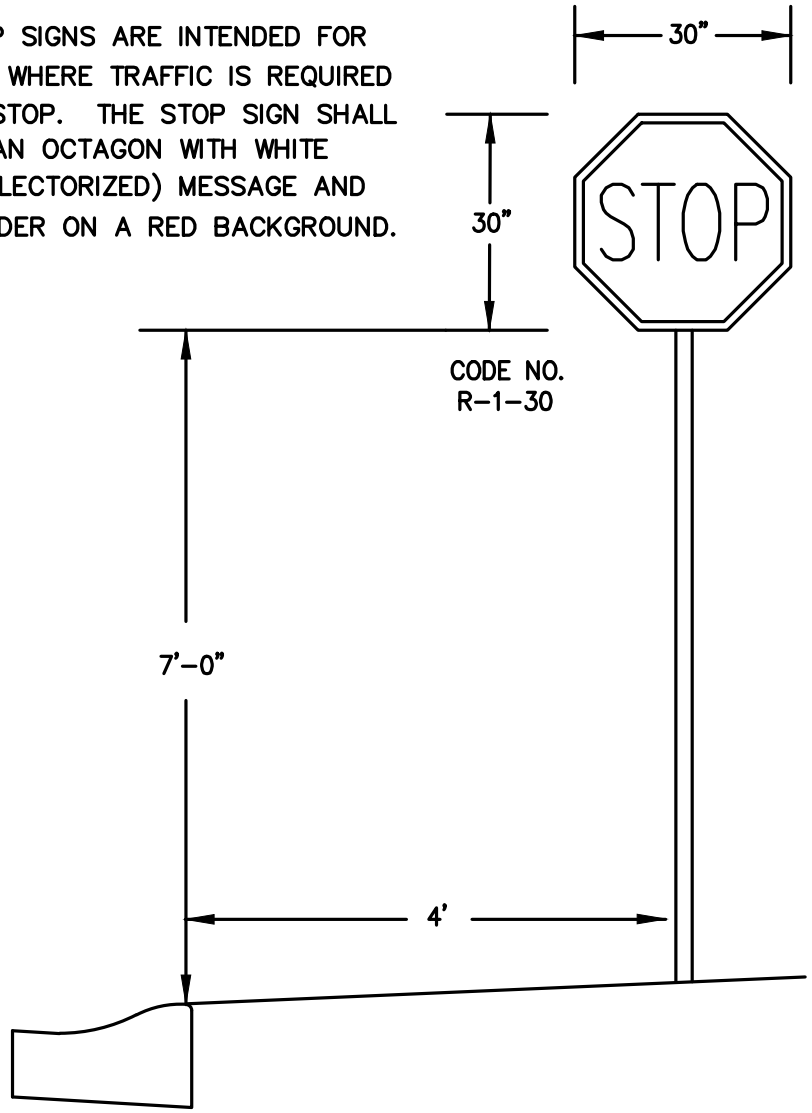


UNDERDRAIN DETAIL

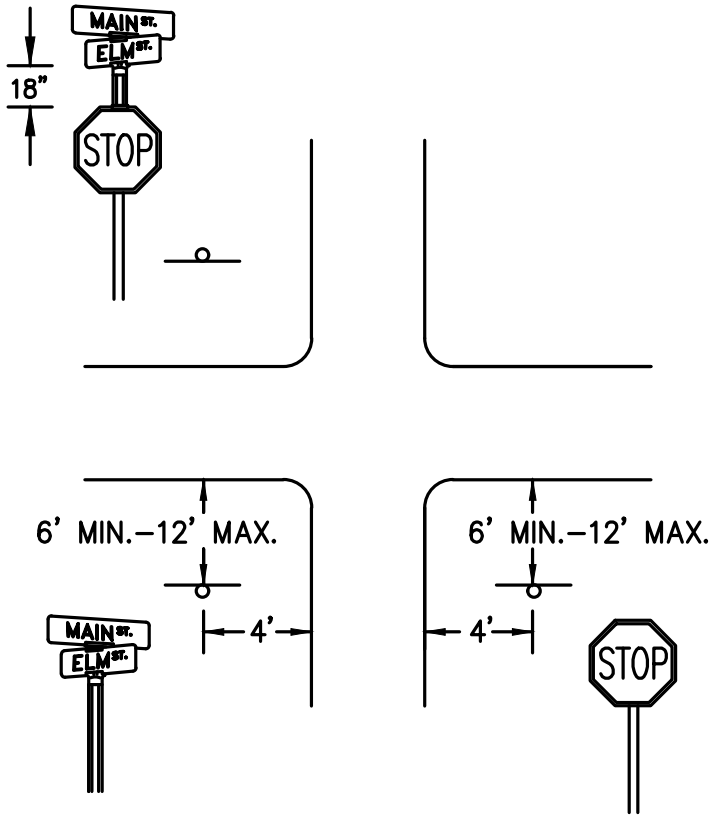
NOT TO SCALE

STD0006

STOP SIGNS ARE INTENDED FOR USE WHERE TRAFFIC IS REQUIRED TO STOP. THE STOP SIGN SHALL BE AN OCTAGON WITH WHITE (REFLECTORIZED) MESSAGE AND BORDER ON A RED BACKGROUND.

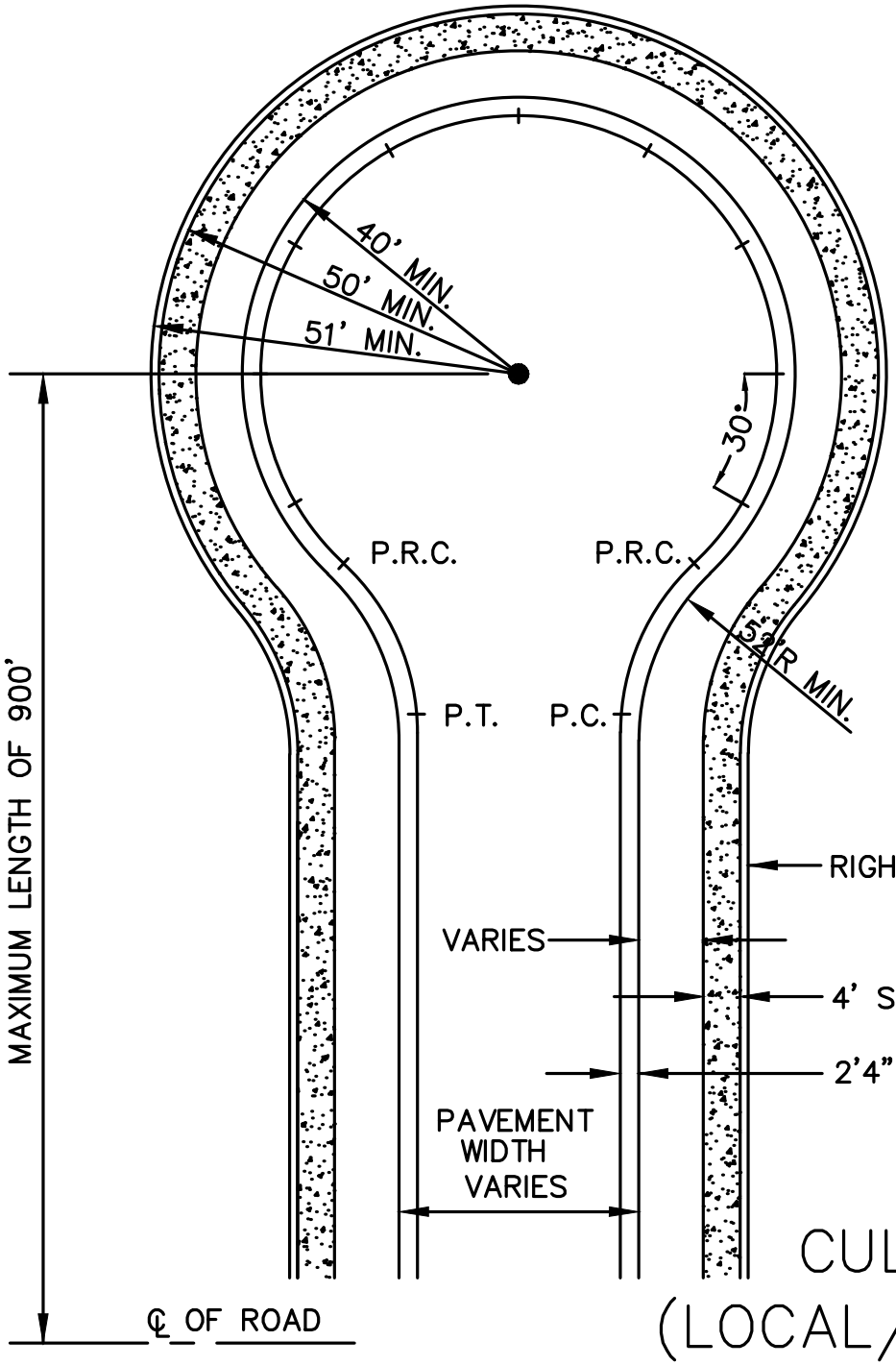


A STOP SIGN MAY BE WARRENTED AT AN INTERSECTION OF A LESS IMPORTANT ROAD WITH A MAIN ROAD WHERE APPLICATION OF THE NORMAL RIGHT-OF-ENTRY RULE IS UNDULY HAZARDOUS . STOP SIGNS SHOULD NOT BE USED FOR SPEED CONTROL. STREET NAME SIGNS MAY BE MOUNTED ON STOP SIGN POSTS BUT MUST BE A MINIMUM OF 18" ABOVE THE STOP SIGN.



STOP SIGN SPECIFICATIONS

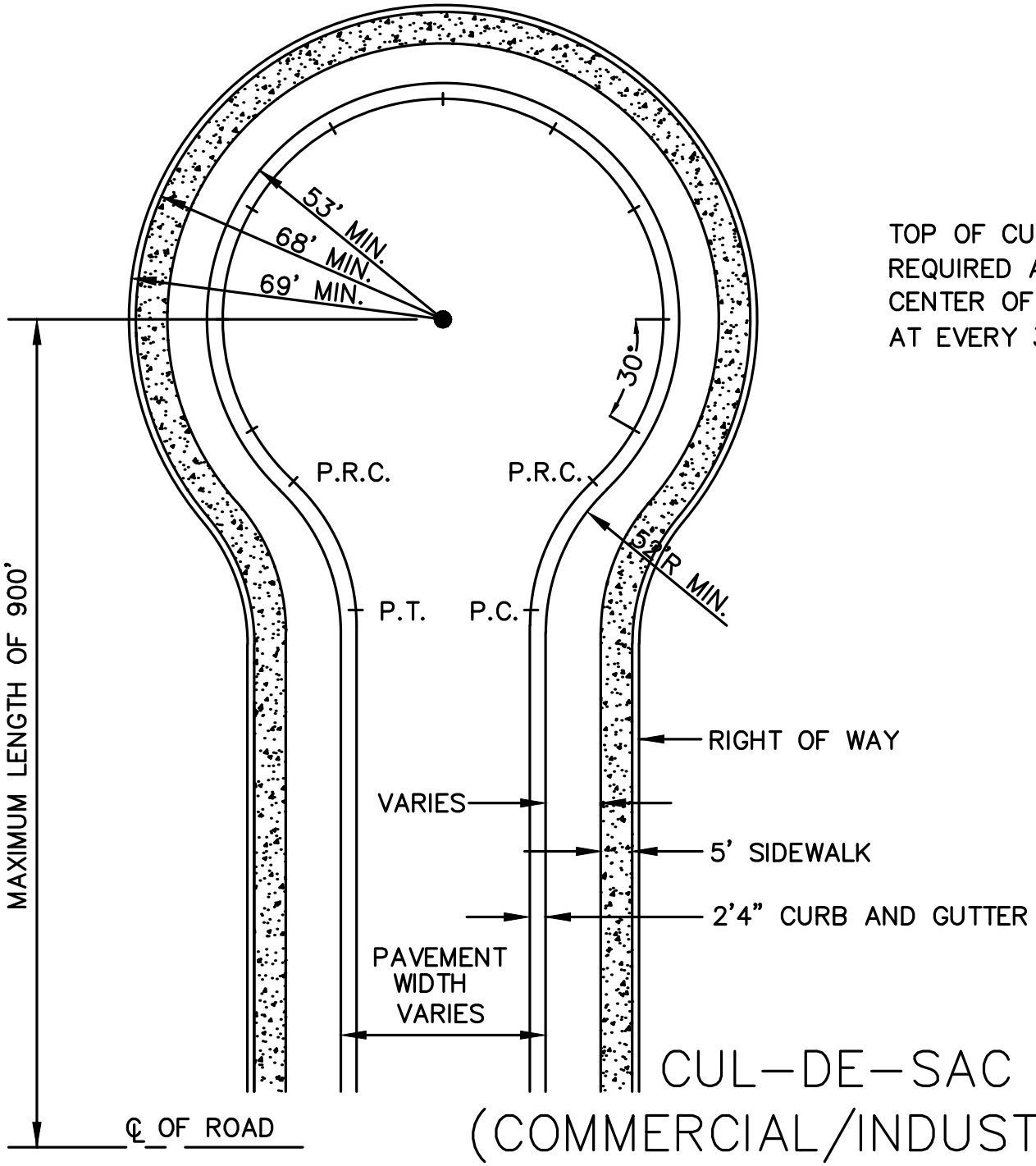
STD0007



TOP OF CURB ELEVATIONS ARE REQUIRED AT P.C., P.R.C., P.T., CENTER OF CUL-DE-SAC, AND AT EVERY 30° FROM CENTER.

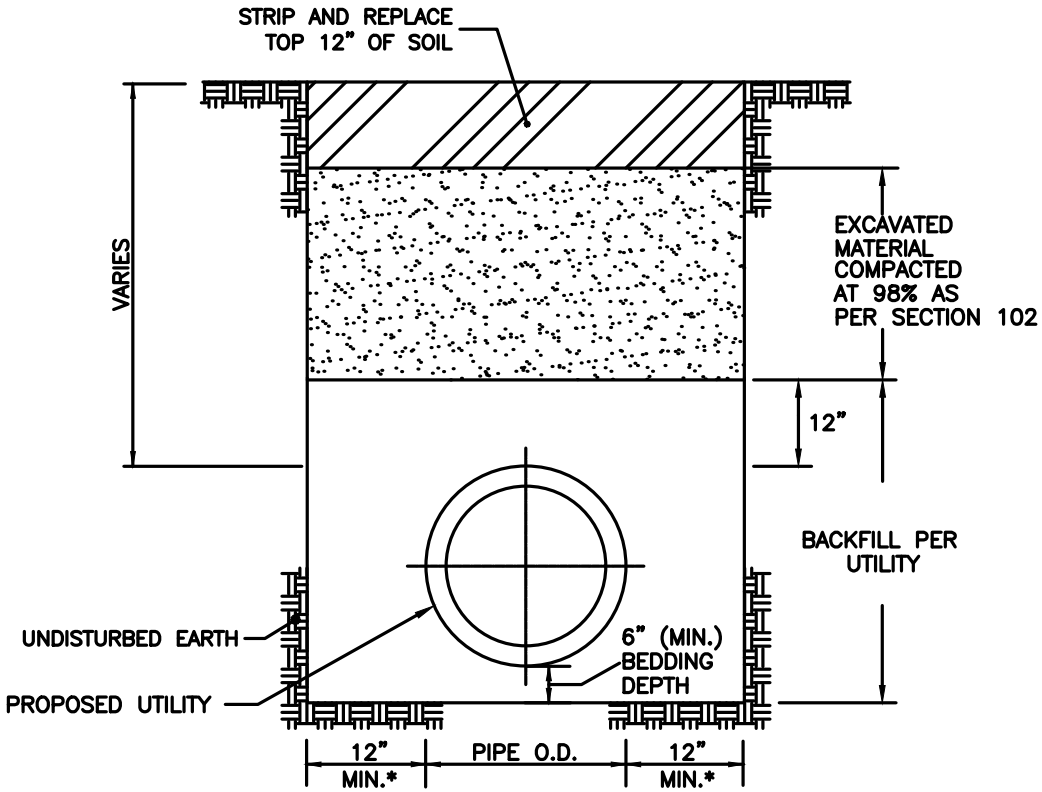
CUL-DE-SAC (LOCAL/RESIDENTIAL)

STD0009



TOP OF CURB ELEVATIONS ARE REQUIRED AT P.C., P.R.C., P.T., CENTER OF CUL-DE-SAC, AND AT EVERY 30° FROM CENTER.

CUL-DE-SAC (COMMERCIAL/INDUSTRIAL) STD0009A



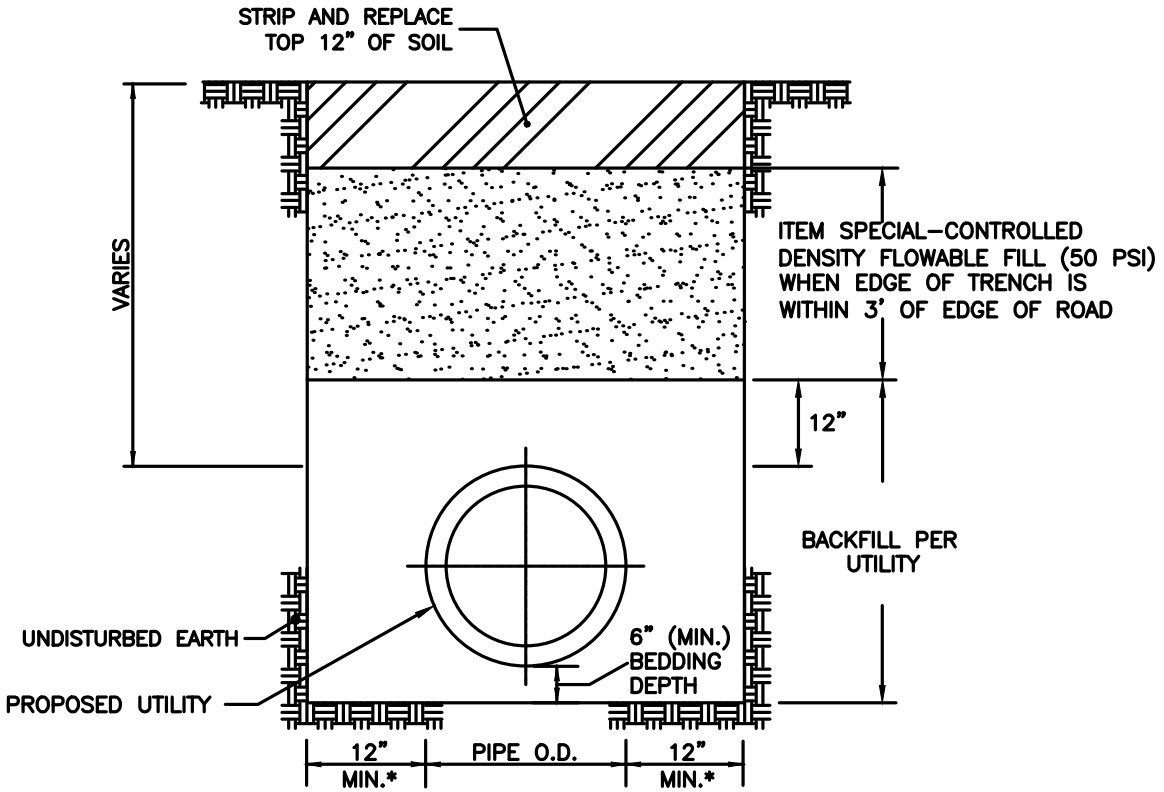
* MAY VARY DUE TO DEPTH
OF PROPOSED UTILITY

TRENCH LIMITS DO NOT
FALL WITHIN 3' OF EXISTING
EDGE OF PAVEMENT

STANDARD TRENCH

N.T.S.

STD0011



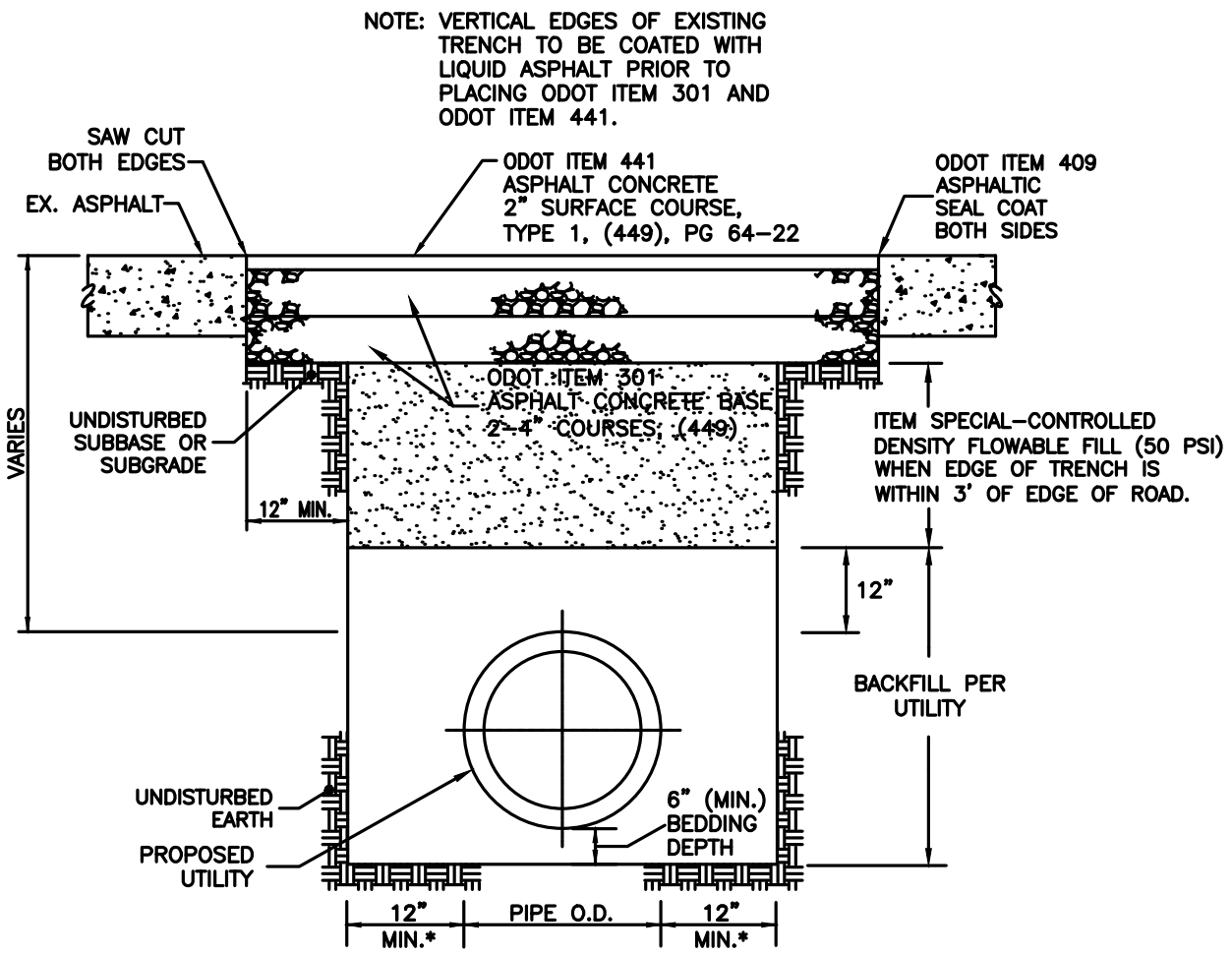
* MAY VARY DUE TO DEPTH
OF PROPOSED UTILITY

TRENCH LIMITS DO
FALL WITHIN 3' OF EXISTING
EDGE OF PAVEMENT

STANDARD TRENCH WITHIN 3' OF EXISTING ROADWAY PAVEMENT

N.T.S.

STD0012



STANDARD TRENCH WITHIN EXISTING ROADWAY PAVEMENT

N.T.S.

STD0013

NOTES:

1. STANDARD GRATE AS SHOWN IN TH PLAN VIEW SHALL BE PROVIDED UNLESS THE PLANS SPECIFICALLY REQUIRE GRATE "V". PLACE GRATE SO THE DIAGONAL BARS DIRECT DRAINAGE TOWARD THE CURB. ALL BAR EDGES TO BE ROUNDED 1/8"RADIUS.

2. CASTINGS: THE DESIGN SHALL BE ESSENTIALLY THE SAME AND EQUALLY AS STRONG AS THOSE SHOWN HEREON. MINIMUM WEIGHTS ARE: CURB CASTINGS 305 LBS., TWO GRATES 254 LBS., FRAME 590 LBS., AND TWO "V"GRATES 210 LBS.
BEARING AREAS OF FRAME AND GRATE SHALL BE SO FITTED AND FINISHED, WITHOUT PROJECTIONS, AS TO PROVIDE A FIRM AND EVEN SEAT FOR ALL PORTIONS OF THE GRATE IN THE FRAME WITHOUT ROCKING.

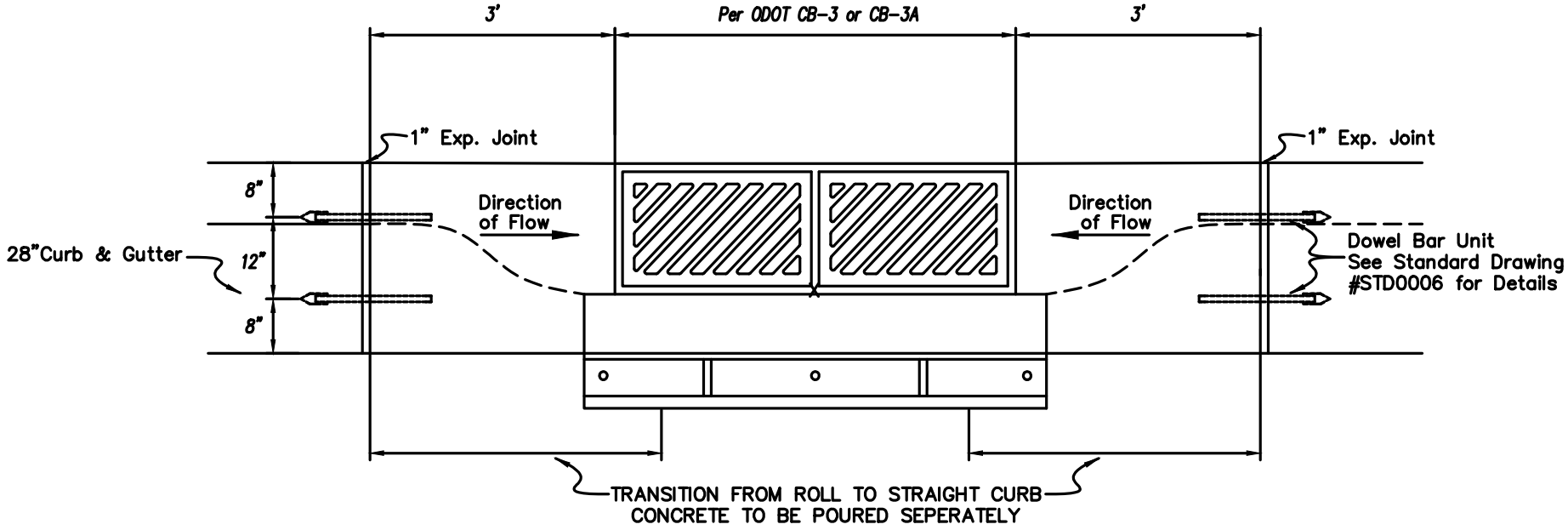
3. DOWELS: FOUR 1"x18" DOWELS ARE REQUIRED FOR CONCRETE PAVEMENT OR GUTTER BLOCKOUT.

4. BRICK OR CONCRETE BLOCK SIDE WALLS, WHEN USED IN PLACE OF CONCRETE, SHALL BE 8"NOMINAL THICKNESS.

5. BLOCKOUT SHALL BE PAVED WITH CLASS C CONCRETE IN PCC PAVEMENT OR GUTTER AND PAID FOR AS PART OF THE PAVEMENT QUANTITIES BECAUSE OF THE CASTING. NO DEDUCTION TO BE MADE IN CURB QUANTITIES.

6. PRECAST CONSTRUCTION IS PERMITTED, CONCRETE SHALL MEET REQUIREMENTS OF 706.13 WITH 6±2% AIR VOID CONTENT IN THE HARDENED CONCRETE. PRECAST WALLS SHALL BE SUFFICIENT TO PERMIT SHIPPING AND PLACEMENT WITHOUT DAMAGE.

INLET INSTALLATION IN
28"CONCRETE CURB & GUTTER

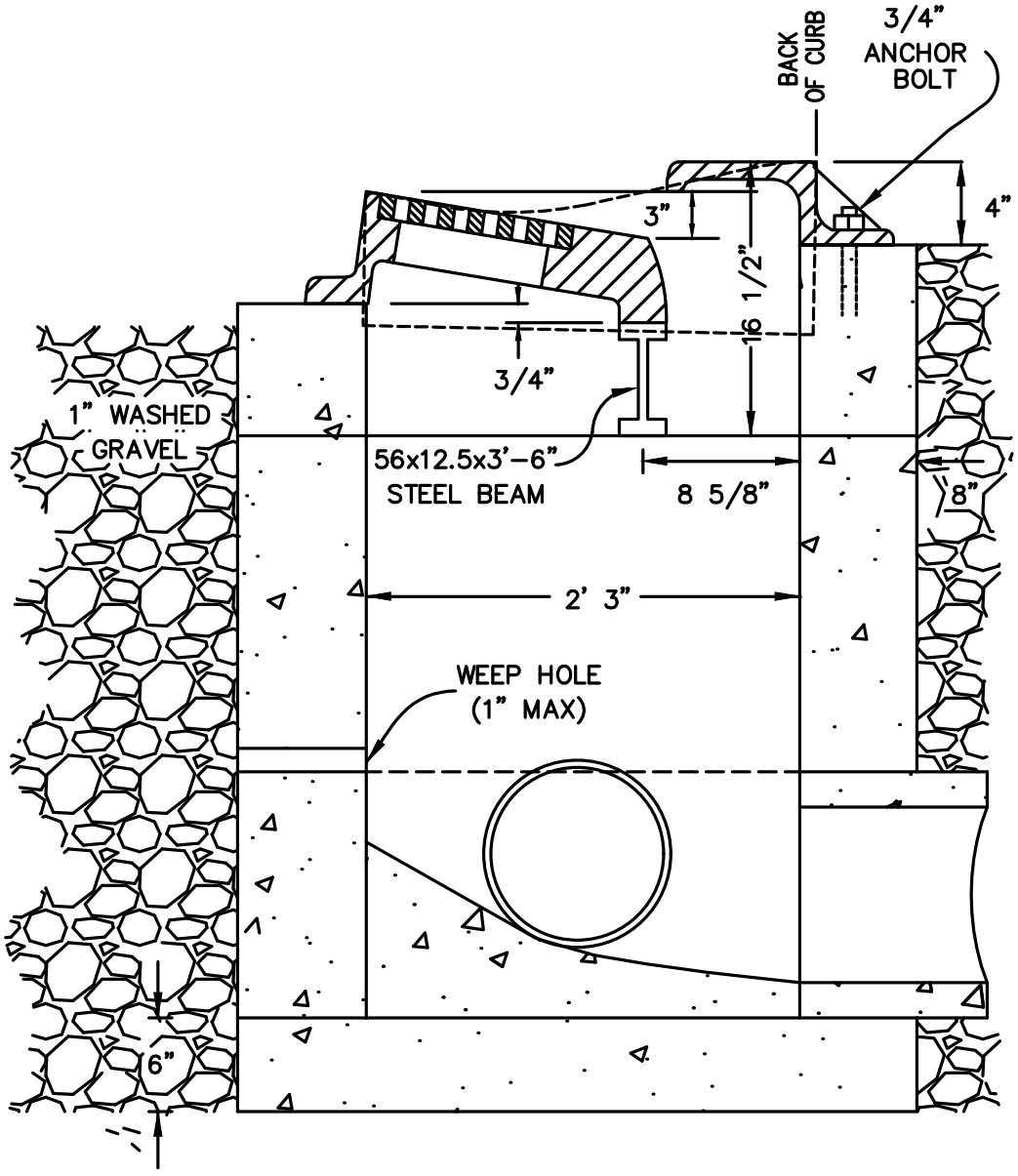


CATCH BASIN NO. 3 AND 3A MODIFIED (1 OF 2)

STD0014

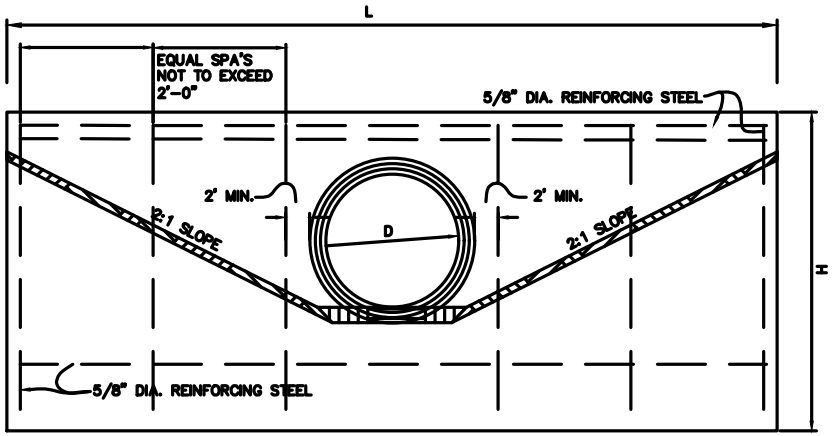
NOTES:

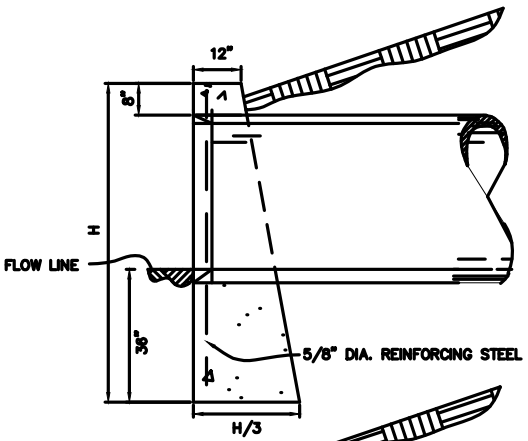
1. CASTINGS AND FRAMES SHALL BE AS REQUIRED ON STATE STANDARD CB–3A FOR A NO. 3A CATCH BASIN. MINIMUM WEIGHTS ARE: CURB CASTING (170 lbs.) STANDARD GRATE (127 lbs.), FRAME (320 lbs.)
2. DOWELS SHALL BE 1" ROUND, SMOOTH BARS 18" ROUND. 4 DOWELS WILL BE REQUIRED FOR A CURB AND GUTTER SECTION WITH AN ASPHALT STREET. 2 ADDITIONAL DOWELS WILL BE REQUIRED FOR A CONCRETE STREET.
3. SOLID BRICK SIDEWALKS, WHEN USED IN PLACE ON CONCRETE, SHALL BE 8" NOMINAL THICKNESS.
4. CONCRETE SHALL BE CLASS "C".
5. PRECAST CONCRETE CONSTRUCTION IS PERMITTED, EXCEPT FOR THE APRON. THE WALLS SHALL HAVE A MINIMUM THICKNESS OF 8" WITH REINFORCING SUFFICIENT TO PERMIT SHIPPING AND PLACEMENT WITHOUT DAMAGE.
6. BEARING AREAS OF THE FRAME AND GRATE SHALL BE SO FITTED AND FINISHED AS TO PROVIDE A FIRM AND EVEN SEAT FOR ALL PORTIONS OF THE GRATE IN THE FRAME. NO PROJECTIONS SHALL EXIST ON BEARING AREAS OF EITHER CASTING AND THE GRATE SHALL SEAT IN ITS FRAME WITHOUT ROCKING.



CATCH BASIN NO. 3 AND 3A MODIFIED (2 OF 2)

STD0015





NOTES

NO.1 HEADWALL WHERE REQUIRED WILL BE PROVIDED FOR NON-SKEWED CULVERTS HAVING A DIAMETER OR RISE OF 36" OR LESS.

CONCRETE SHALL BE CLASS C.

REINFORCING STEEL BARS SHALL BE 5/8" ROUND.

DIMENSIONS AND QUANTITES ARE SHOWN FOR CIRCULAR SECTIONS ONLY. IT WILL BE NECESSARY TO DETERMINE DIMENSIONS FOR THE NO.1 HEADWALL REQUIRED FOR REINFORCED ELLIPTICAL CONCRETE PIPE OR CORRUGATED METAL PIPE ARCHES IN ACCORDANCE WITH THE EQUATIONS LISTED ON THIS DRAWING. CHAMFER ALL CORNERS 3/4".

FOUNDATION . WHERE THE SOIL BORINGS INDICATE A BEARING CAPACITY OF LESS THAN 2800 LBS. PER SQUARE FOOT, IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE BASE.

DIMENSIONS			QUANTITIES ONE HEADWALL	
DIAMETER	H	L	CONCRETE CU. YDS.	REINFORCING STEEL (LBS.)
15"	5'-2"	7'-0"	1.7	41
18"	5'-5"	8'-4"	2.2	57
21"	5'-8"	9'-8"	2.8	62
24"	5'-11"	11'-0"	3.3	69
30"	6'-5"	13'-8"	4.7	92
36"	7'-0"	18'-4"	6.5	105

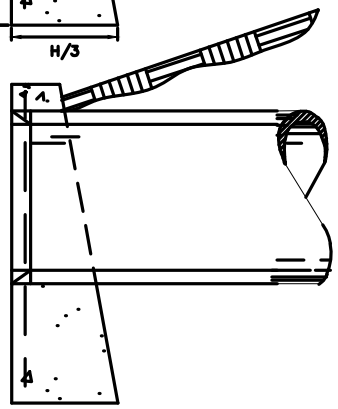
L CIRCULAR SECTIONS = 5D + 4r

L ELLIPTICAL OR PIPE-ARCH = 4R + 4r + S

H CIRCULAR SECTIONS = D + r + 44"

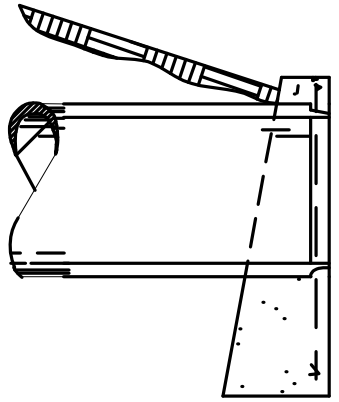
H ELLIPTICAL OR PIPE-ARCH = R + r + 44"

D = DIAMETER OF PIPE
R = RISE OF PIPE
S = SPAN OF PIPE
r = THICKNESS OF BARREL
L = LENGTH OF HEADWALL
H = HEIGHT OF HEADWALL

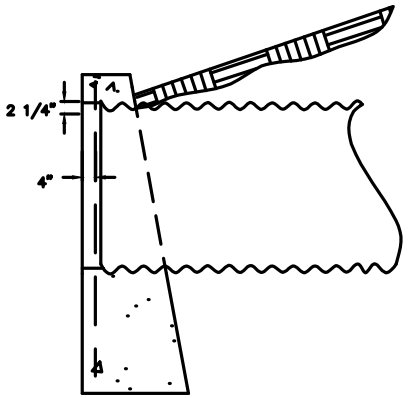


INLET END
GROOVE OR BELL UPSTREAM

RIGID PIPE

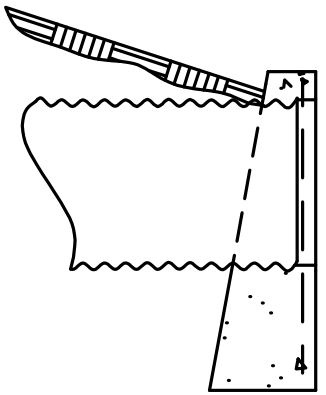


OUTLET END
TONGUE OR SPIGOT DOWNSTREAM



INLET END

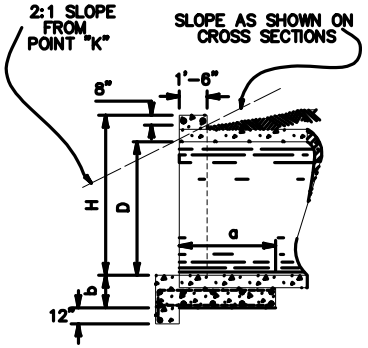
CORRUGATED PIPE



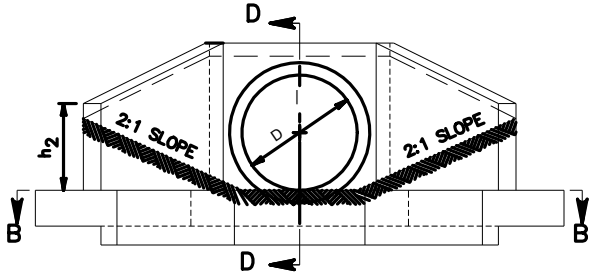
OUTLET END

HEADWALLS HW-1

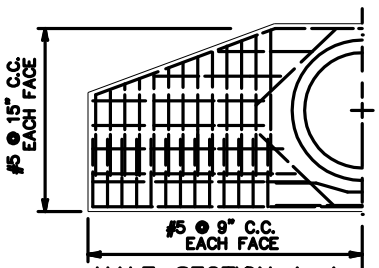
STD0017



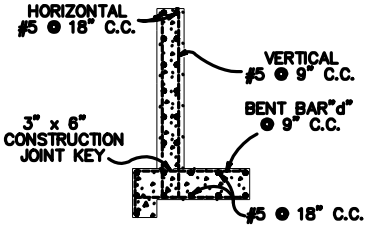
SECTION D–D



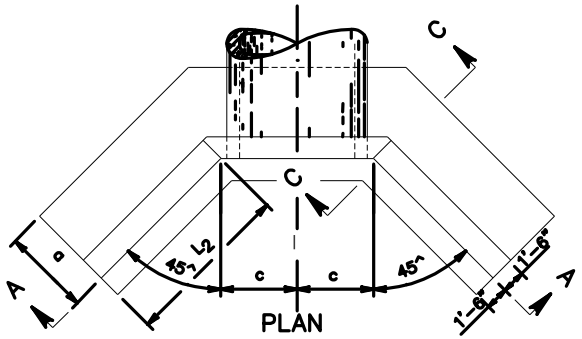
ELEVATION



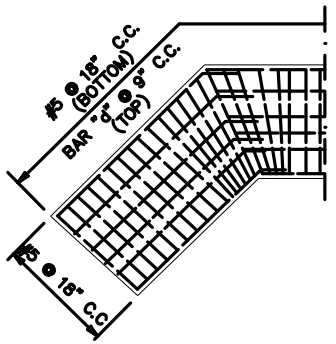
HALF–SECTION A–A



SECTION C–C



PLAN
TYPE "A"



HALF–SECTION B–B

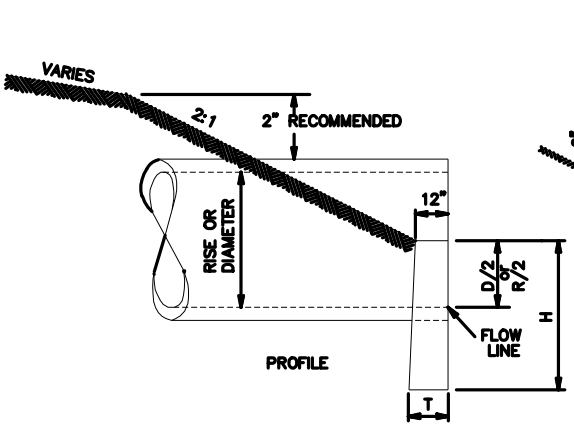
HW–3 HEADWALLS WHERE REQUIRED WILL BE PROVIDED FOR SKEWED AND NONSKEWED CULVERTS HAVING A DIAMETER OR RISE OF 42 TO 84 INCHES INCLUSIVE.

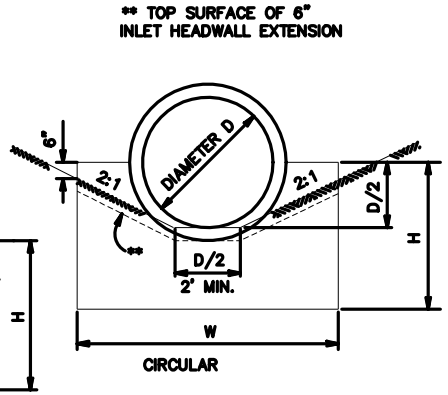
DIMENSIONS AND QUANTITIES ARE SHOWN FOR CIRCULAR SECTIONS ONLY. WHEN USED WITH REINFORCED ELLIPTICAL CONCRETE PIPE OR CORRUGATED METAL PIPE ARCHES IT IT WILL BE NECESSARY TO DETERMINE SUCH DIMENSIONS AND QUANTITIES WHICH SHALL GENERALLY CONFORM WITH THOSE LISTED FOR THE NEAREST SIZE CIRCULAR PIPE. THE DIMENSIONS ESTABLISHED BY VERTICAL DIAMETER SHALL APPLY TO RISE AND THE DIMENSIONS ESTABLISHED BY HORIZONTAL DIAMETER SHALL APPLY TO SPAN.
CHAMFER ALL EXPOSED CORNERS TO 3/4 OF AN INCH.

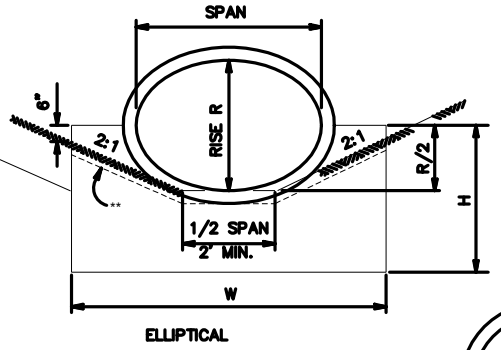
FOUNDATION: WHERE THE SOIL BORINGS INDICATE A BEARING CAPACITY OF LESS THAN 2500 LBS. PER SQUARE FOOT IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE FOOTING.

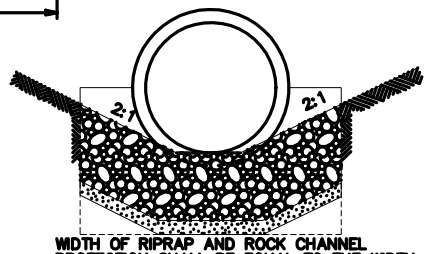
PIPE DIAM. D	M	a	b	c	BAR d	L_2	h_2	C.Y. CONC. CMP.	C.Y. CONC. RCP	STEEL LBS.	PIPE DIAM. D
42"	4'–11"	3'–3"	1'–6"	2'–5"	#5	7'–9"	3'–3"	8.7	8.5	718	42"
48"	5'–5"	3'–6"	1'–6"	2'–9"	#5	9'–2"	3'–7"	10.6	10.3	925	48"
54"	5'–11"	3'–9"	1'–6"	3'–0"	#5	10'–7"	3'–10"	12.6	12.2	1188	54"
60"	6'–6"	4'–0"	1'–6"	3'–3"	#5	12'–0"	4'–1"	14.8	14.3	1354	60"
72"	7'–7"	4'–6"	1'–7"	3'–9"	#7	14'–10"	4'–8"	20.2	19.6	2075	72"
84"	8'–8"	5'–0"	1'–10"	4'–3"	#8	17'–8"	5'–2"	27.9	27.0	2990	84"

HEADWALLS HW–3 STD0018



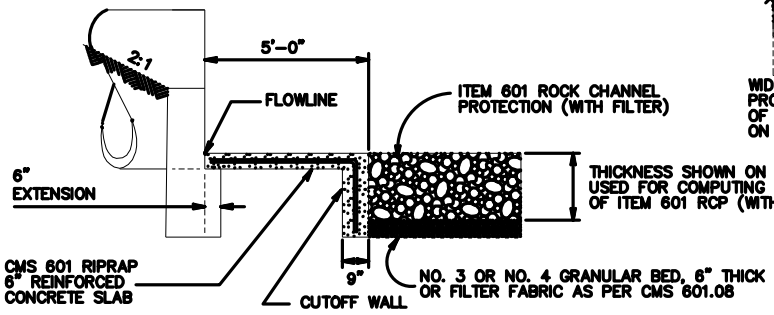






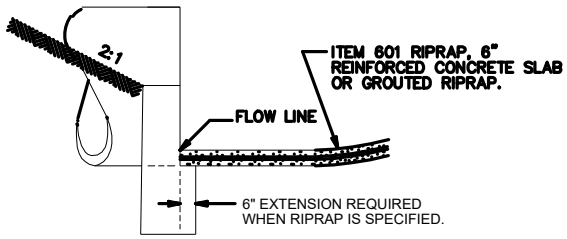
WIDTH OF RIPRAP AND ROCK CHANNEL PROTECTION SHALL BE EQUAL TO THE WIDTH OF HEADWALL UNLESS OTHERWISE SHOWN ON THE PLANS. (MINIMUM WIDTH 4'–0")

CONCRETE PIPE



OUTLET CHANNEL PROTECTION DETAIL

THE DEPTH OF THE RIPRAP CUTOFF WALL (2'–6" min.) SHALL MATCH THE THICKNESS OF THE ROCK CHANNEL PROTECTION SHOWN ON THE PLANS PLUS 6".



INLET CHANNEL PROTECTION DETAIL

NOTE

CONCRETE: CONCRETE HEADWALLS SHALL BE CLASS C. CONCRETE QUANTITIES BASED ON HEADWALLS WITHOUT THE 6" EXTENSION UNDER THE CHANNEL PROTECTION.

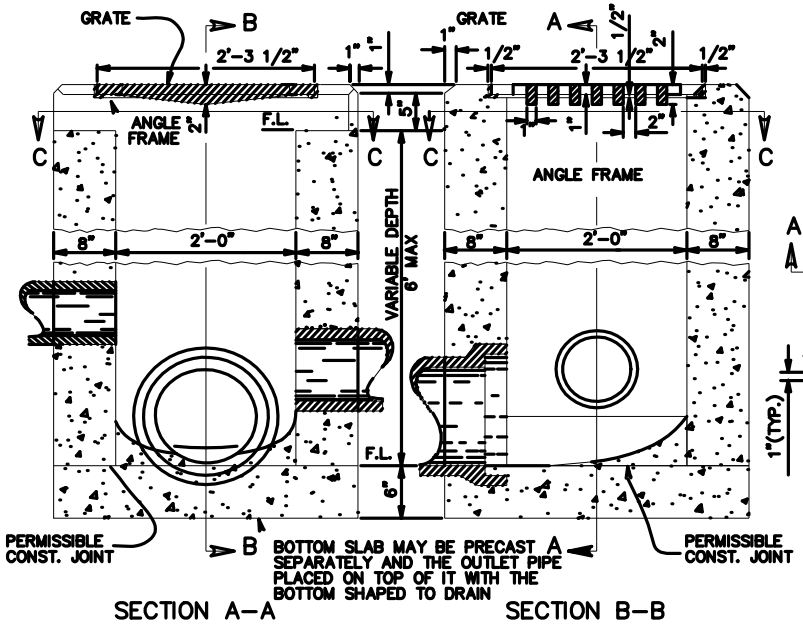
HEADWALL FOR CONCRETE PIPE

CIRCULAR					ELLIPTICAL					
D	W	H	T	Conc. Cu. Yds.	Span	Rise	W	H	T	Conc. Cu. Yds.
12"	2'-0"	3'-0"	12"	.20	23"	14"	3'-0"	3'-2"	12"	.29
15"	2'-6"	3'-2"	12"	.25	30"	19"	3'-7"	3'-4"	12"	.35
18"	3'-0"	3'-3"	12"	.31	34"	22"	3'-11"	3'-5"	12"	.38
21"	3'-6"	3'-4"	12"	.37	38"	24"	4'-6"	3'-6"	12"	.44
24"	4'-0"	3'-6"	12"	.43	42"	27"	4'-8"	3'-7"	12"	.45
27"	4'-6"	3'-8"	12"	.49	45"	29"	5'-2"	3'-8"	12"	.49
30"	5'-0"	3'-9"	12"	.56	49"	32"	5'-5"	3'-10"	12"	.52
33"	5'-6"	3'-10"	12"	.62	53"	34"	5'-11"	4'-0"	14"	.66
36"	6'-0"	4'-0"	12"	.69	60"	38"	6'-10'	4'-2"	14"	.82
39"	6'-6"	4'-2"	12"	.77	68"	43"	8'-0"	4'-4"	16"	1.01
42"	7'-0"	4'-3"	12"	.84	76"	48"	9'-2"	5'-0"	16"	1.34
48"	8'-0"	4'-6"	12"	1.09	83"	53"	10'-4"	5'-2"	18"	1.65
54"	9'-3"	4'-9"	14"	1.32	91"	58"	11'-6"	5'-5"	18"	1.97
60"	10'-6"	5'-6"	16"	1.93	98"	63"	12'-7"	5'-7"	20"	2.38
66"	11'-9"	5'-9"	18"	2.42	106"	68"	13'-9"	5'-10"	20"	2.69
72"	13'-0"	6'-0"	18"	2.77	113"	72"	14'-9"	6'-0"	22"	3.14
78"	14'-3"	6'-3"	20"	3.37	121"	77"	15'-11"	6'-3"	22"	3.49
84"	15'-6"	6'-6"	22"	4.05	128"	82"	17'-0"	6'-5"	24"	4.04
90"	16'-9"	6'-9"	22"	4.51	136"	87"	18'-2"	6'-8"	24"	4.84
96"	18'-0"	7'-0"	24"	5.31	143"	92"	19'-4"	6'-10"	26"	5.12
102"	19'-3"	7'-3"	26"	6.20	151"	97"	20'-6"	7'-1"	26"	5.42
108"	20'-6"	7'-6"	26"	6.78	166"	106"	22'-7"	7'-5"	28"	6.60
114"	21'-9"	7'-9"	28"	7.81	180"	116"	24'-10"	7'-10"	30"	7.99
120"	23'-0"	8'-0"	30"	8.93						
126"	24'-3"	8'-3"	30"	9.57						
132"	25'-6"	8'-6"	32"	10.84						
144"	28'-0"	9'-0"	34"	13.00						

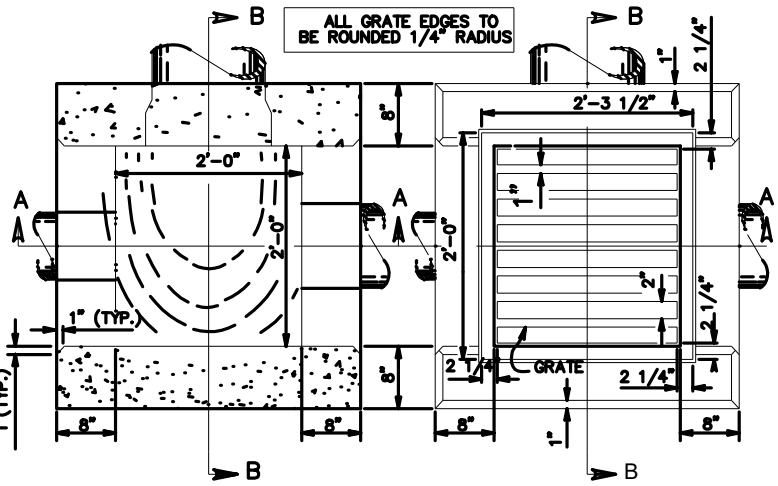
CONCRETE PIPE HEADWALLS HW–4B

STD0019

CATCH BASIN No. 2-2A



SECTION A-A SECTION B-B



SECTION C-C PLAN

NOTES

GRATE AND FRAME: THE DESIGN SHALL BE ESSENTIALLY THE SAME AND EQUALLY AS STRONG AS THE ONE SHOWN HEREON. WEIGHT OF GRATE: MIN. 120 LBS. WEIGHT OF FRAME: MIN. 40 LBS.

BRICK, CONCRETE BLOCK OR CAST-IN-PLACE WALLS HAVE A NOMINAL THICKNESS OF 8". PRECAST WALLS SHALL HAVE A MINIMUM THICKNESS OF 6" AND BE REINFORCED SUFFICIENTLY TO PERMIT SHIPPING AND HANDLING WITHOUT DAMAGE. BRICK OR CONCRETE BLOCK SHALL NOT BE USED ABOVE THE FLOW-LINE OF THE SIDE OPENING FOR TYPE 2-2-A.

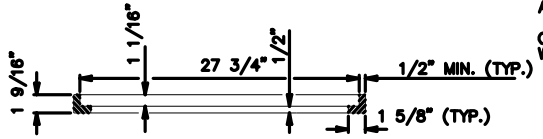
2-2-A SIDE INLETS TO BE PLACED 4"-6" BELOW NORMAL ELEVATIONS OF MEDIAN OR DITCH FLOW LINE RETURNING TO NORMAL 10' EACH SIDE OF BASIN.

2-2-B GRATE ELEVATION TO BE PLACED 4"-6" BELOW NORMAL DITCH RETURNING TO NORMAL 10' EACH SIDE OF BASIN.

SIDE INLETS SHALL BE PROVIDED ON BOTH SIDES OF THE 2-2-A CATCH BASIN IN SAGS AND ON UPSTREAM SIDE ONLY WHERE THE DITCH HAS A CONTINUOUS DOWNGRADE PAST THE CATCH BASIN.

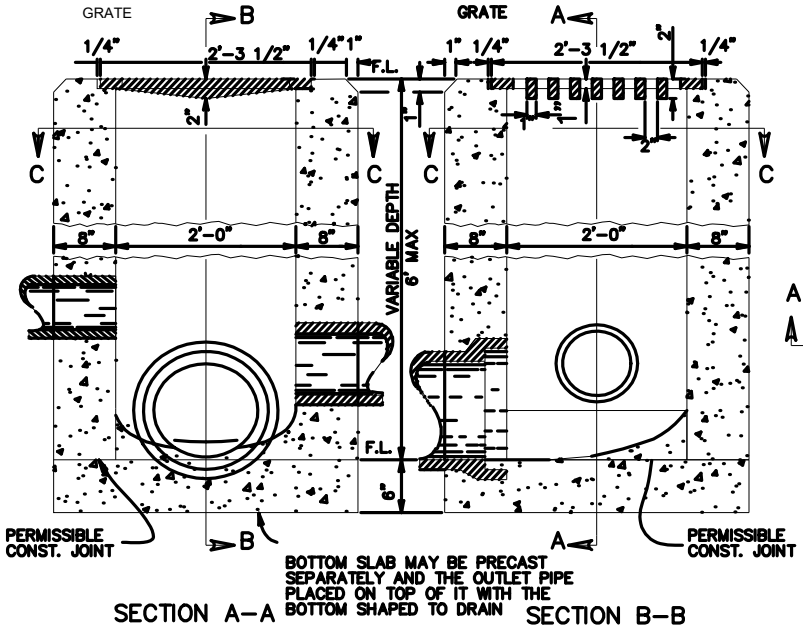
CONCRETE, CAST-IN-PLACE, TO BE CLASS C. ALL PRECAST CONCRETE SHALL MEET THE REQUIREMENTS OF 706.13 WITH 6±2% AIR VOID CONTENT IN THE HARDENED CONCRETE AND BE MARKED WITH CATCH BASIN NUMBER.

OPENINGS FOR PIPES SHALL BE O.D. +2" WHEN FABRICATED OR FIELD CUT.

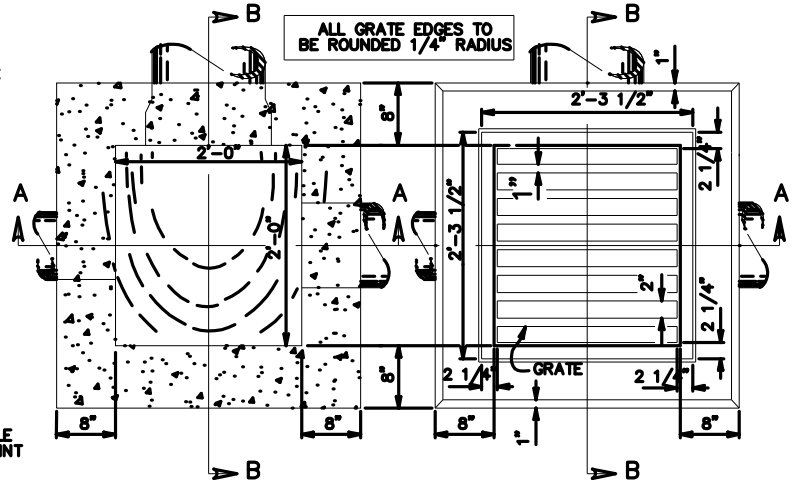


SECTION THRU ANGLE FRAME
FOR STANDARD No. 2-2A CATCH BASIN

CATCH BASIN No. 2-2B



SECTION A-A SECTION B-B

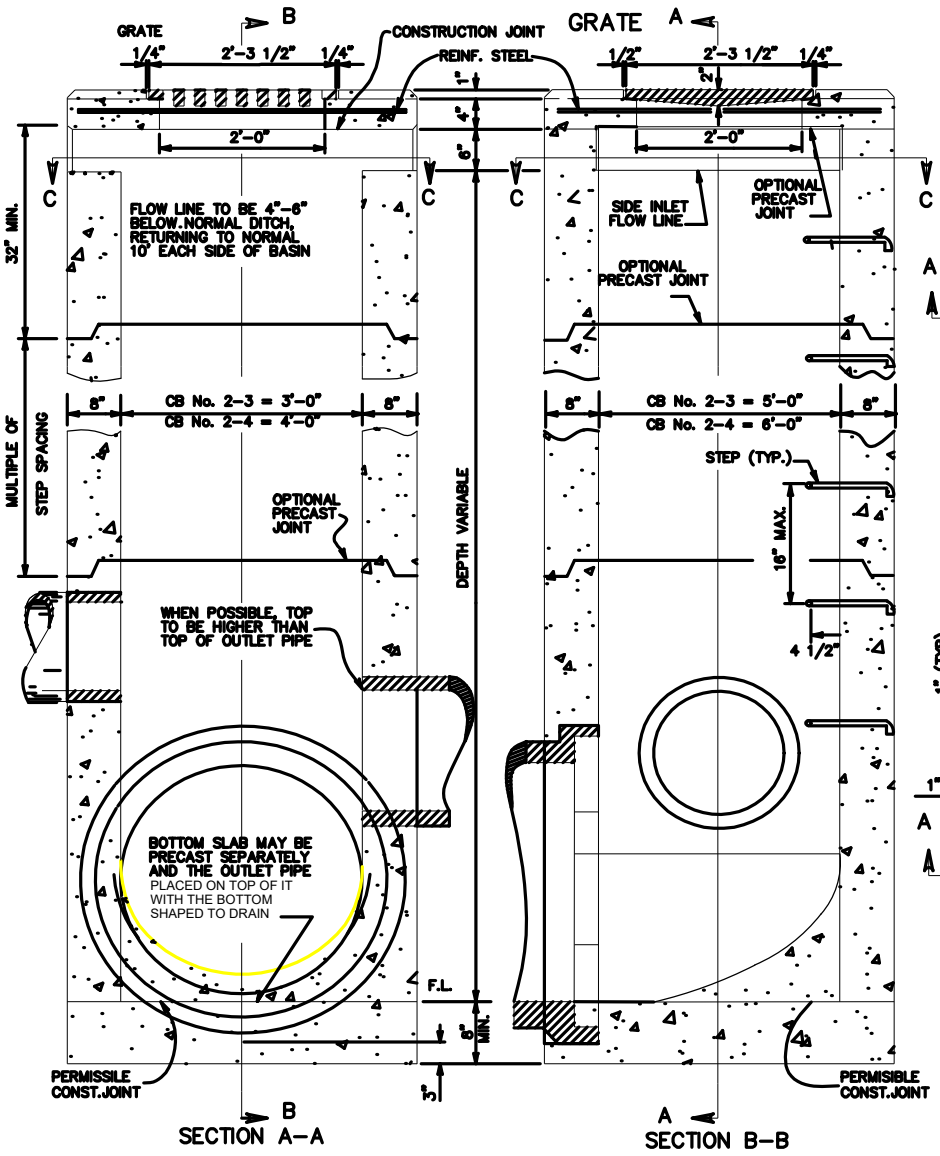


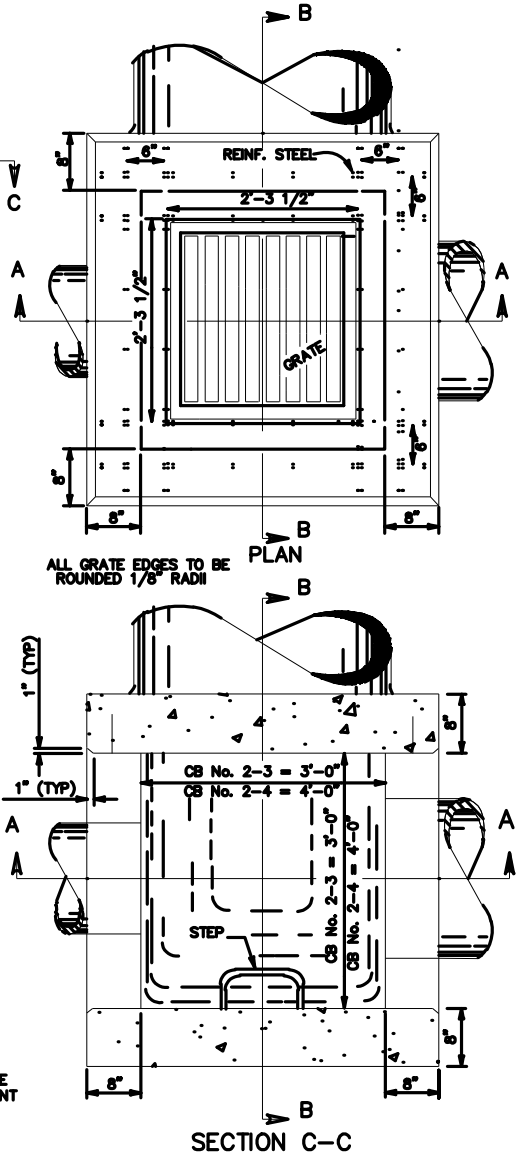
SECTION C-C PLAN

INLETS 2-2A & 2-2B

STD0020

CATCH BASINS No. 2–3 & No. 2–4





NOTES

GRATING– THE DESIGN SHALL BE ESSENTIALLY THE SAME AND EQUALLY AS STRONG AS THE ONE SHOWN HEREON.
MIN. WEIGHT 120 LBS.

BRICK, CONCRETE BLOCK, OR CAST–IN–PLACE WALLS SHALL HAVE A NOMINAL THICKNESS OF 8". PRECAST WALLS SHALL HAVE A MINIMUM THICKNESS OF 6" AND BE REINFORCED SUFFICIENTLY TO PERMIT SHIPPING AND HANDLING WITHOUT DAMAGE.

CONCRETE, CAST–IN–PLACE, TO BE CLASS C. ALL PRECAST CONCRETE SHALL MEET THE REQUIREMENTS OF 706.13 WITH 6±2% AIR VOID CONTENT IN THE HARDENED CONCRETE AND BE MARKED WITH THE CATCH BASIN NUMBER.

REINFORCING IN THE TOP TO BE NO. 4 BARS 6" CENTER TO CENTER. FOR STANDARD NO. 2–3 USE 8 BARS AND FOR STANDARD 2–4 USE 12 BARS.

OPENINGS FOR PIPES SHALL BE O.D. +2" WHEN PREFABRICATED OR FIELD CUT.

LOCATION AND ELEVATION WHEN GIVEN ON THE PLANS IS TOP CENTER OF THE GRATE. WHEN SIDE OPENINGS ARE PROVIDED, ELEVATION SHALL BE THE FLOW LING OF THE SIDE INLET.

SIDE INLETS SHALL BE PROVIDED WHERE THE DEPTH EXCEEDS 72" AND SHALL MEET THE REQUIREMENTS OF MH–1

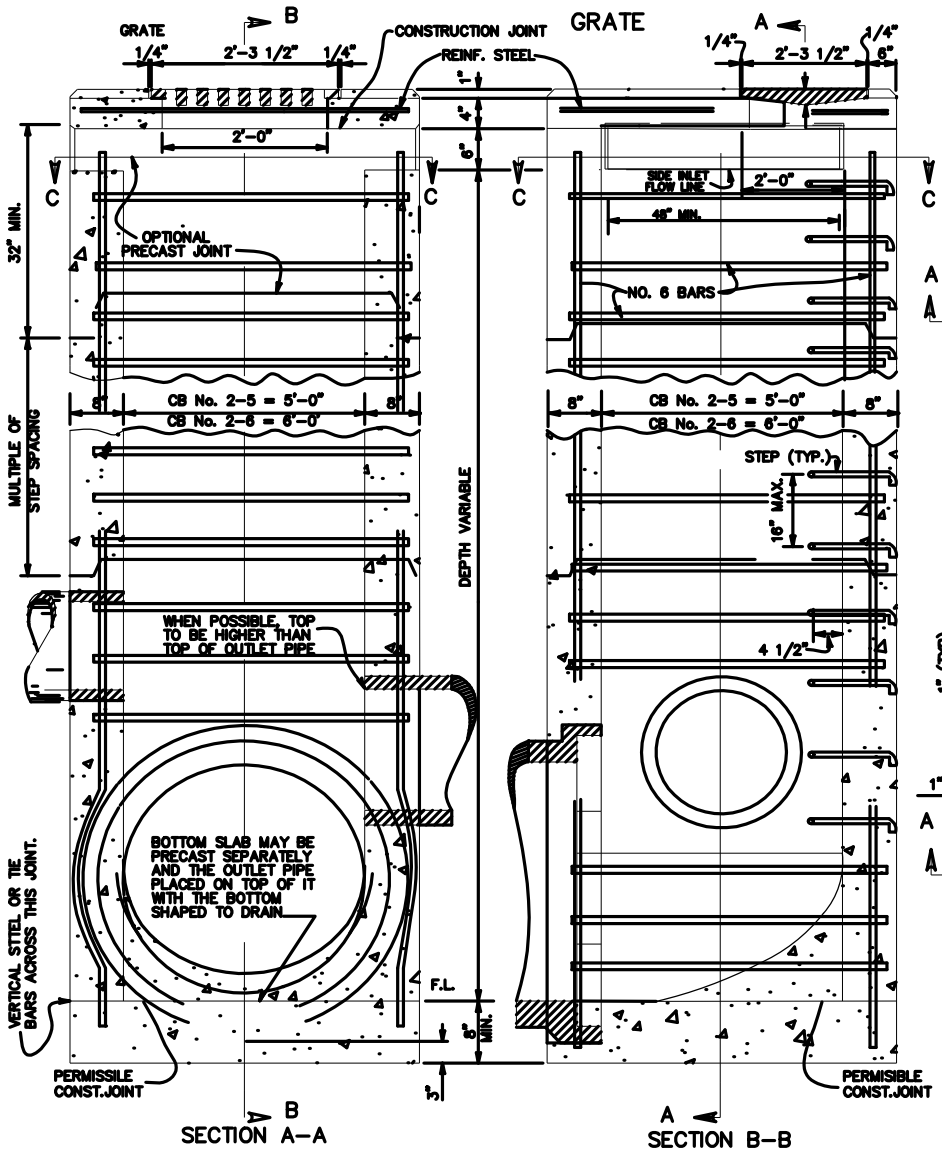
CATCH BASIN SIZE	OUTLET PIPE SIZE
2–3	12" TO 33"
2–4	36" TO 42"

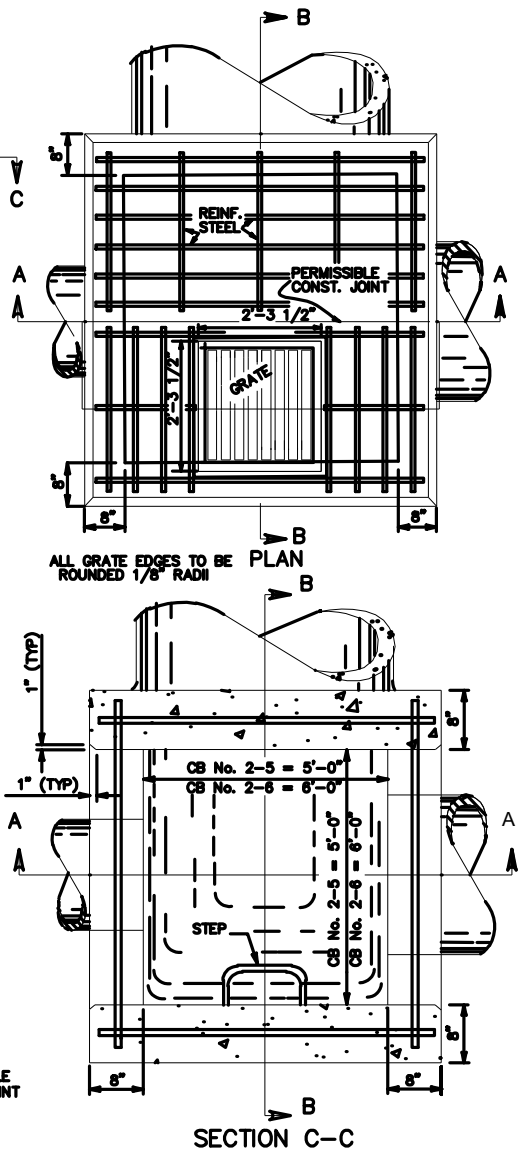
INLETS 2–3 AND 2–4

SCALE : NONE

STD0021

CATCH BASINS No. 2–5 & No. 2–6





NOTES

GRATING– THE DESIGN SHALL BE ESSENTIALLY THE SAME AND EQUALLY AS STRONG AS THE ONE SHOWN HEREON.
MIN. WEIGHT 120 LBS.

STEPS SHALL BE PROVIDED WHERE THE DEPTH EXCEEDS 72" AND SHALL MEET THE REQUIREMENTS OF MH–1

REINFORCING IN THE TOP TO BE NO. 6 BARS 6" CENTER TO CENTER AND NO. 6 TIE BARS SPACED. AS SHOWN. MAIN BARS TO CLEAR BOTTOM SLAB 1 1/4". SIDE WALLS TO BE REINFORCED WITH NO. 6 BARS HORIZONTAL IN EACH SIDE, 6' LONG FOR STANDARD NO. 2–5 AND 7' LONG FOR STANDARD NO. 2–6 SPACED 1' CENTER TO CENTER AND NO. 6 BARS IN EACH CORNER, LENGTH = DEPTH + 1 FOOT.

CONCRETE, CAST–IN–PLACE, TO BE CLASS C. ALL PRECAST CONCRETE SHALL MEET THE REQUIREMENTS OF 706.13 WITH 6±2% AIR VOID CONTENT IN THE HARDENED CONCRETE AND BE MARKED WITH THE CATCH BASIN NUMBER.

OPENINGS FOR PIPES SHALL BE O.D. +2" WHEN PREFABRICATED OR FIELD CUT.

LOCATION AND ELEVATION WHEN GIVEN ON THE PLANS IS TOP CENTER OF THE GRATE. WHEN SIDE OPENINGS ARE PROVIDED, ELEVATION SHALL BE THE FLOW LING OF THE SIDE INLET.

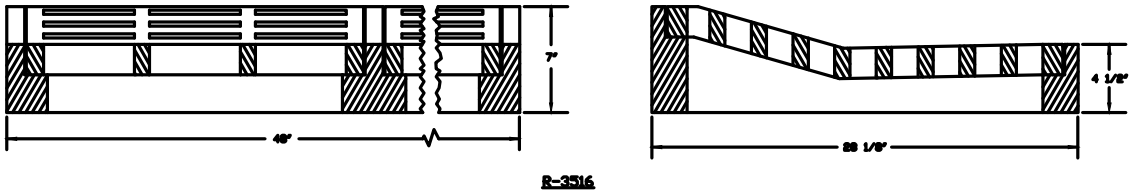
SIDE INLETS SHALL BE PROVIDED ONLY WHEN SPECIFIED ON THE PLANS.

CATCH BASIN SIZE	OUTLET PIPE SIZE
2–5	48" TO 54"
2–6	60" TO 72"

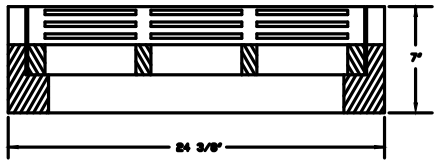
INLETS 2–5 AND 2–6

SCALE : NONE

STD0022



R-3516



R-3516-1

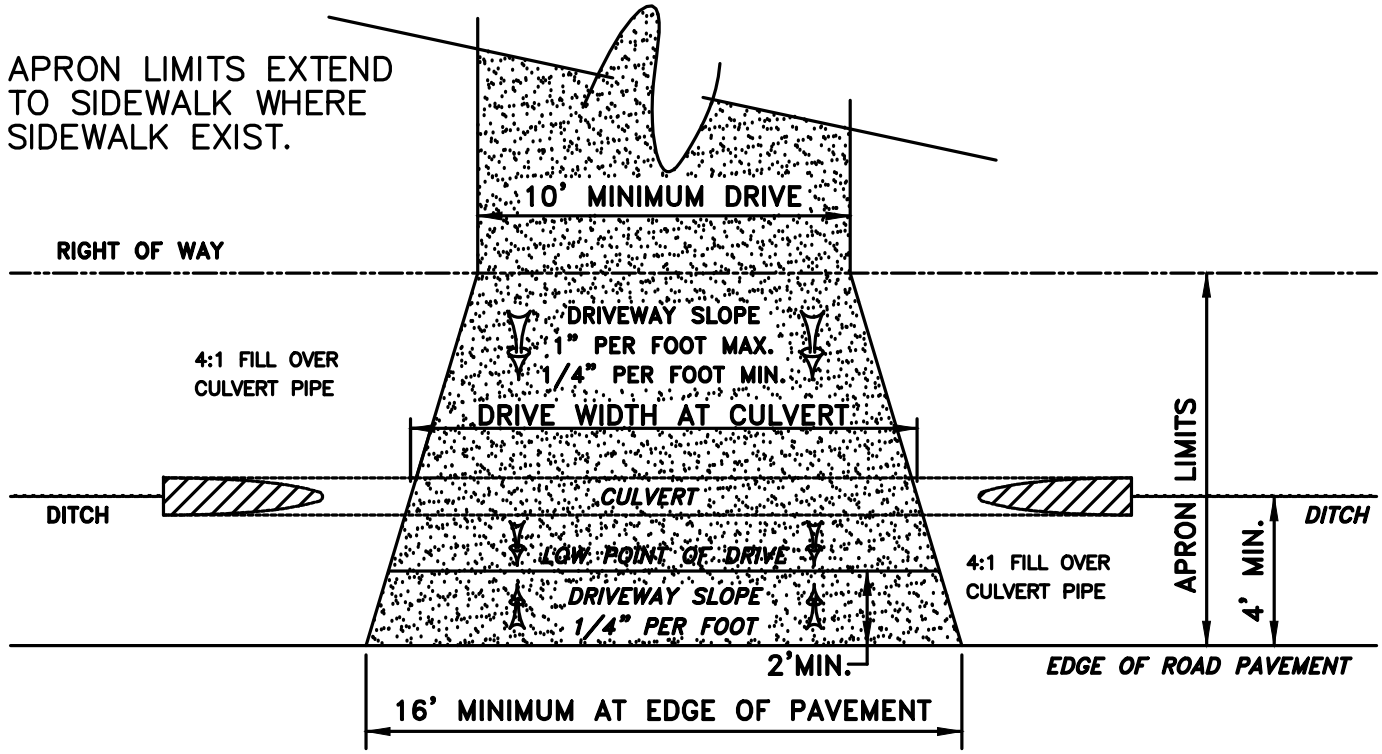
DRIVEWAY INLETS

SCALE : NONE

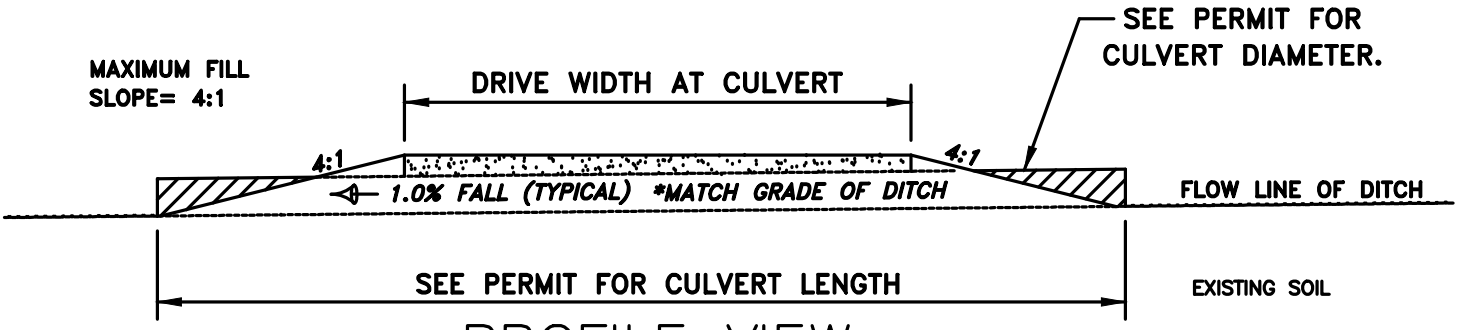
STD0023

STD0024

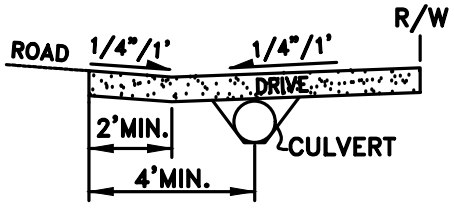
DRIVEWAY APRON WITH OPEN DITCH



PLAN VIEW



PROFILE VIEW
OF CULVERT



PROFILE VIEW
OF DRIVE

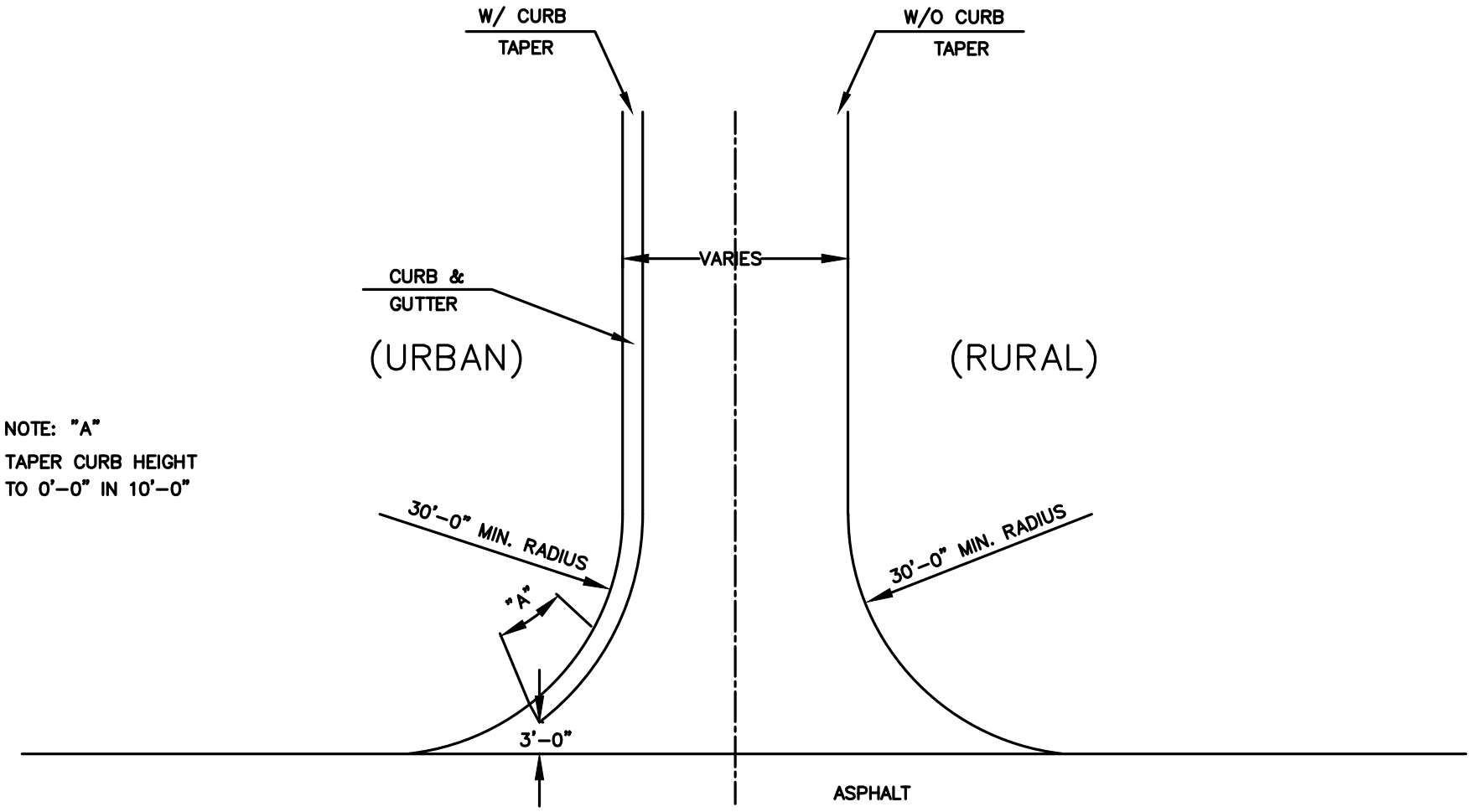
Asphalt Apron–

8" of 304 aggregate stone (2 lifts)
4" of 404 bituminous asphalt (2 lifts)

Concrete Apron –

Class C concrete is required from Edge Of Pavement to R/W. The slab must be 5" thick. One inch expansion material required against any existing concrete. No more than 2% calcium chloride added to mix. No more than 2 gallons of water per cubic yard added to mix at the beginning of load. No water spray on mix after material is placed in forms. No more than a 5" slump in the concrete mix.

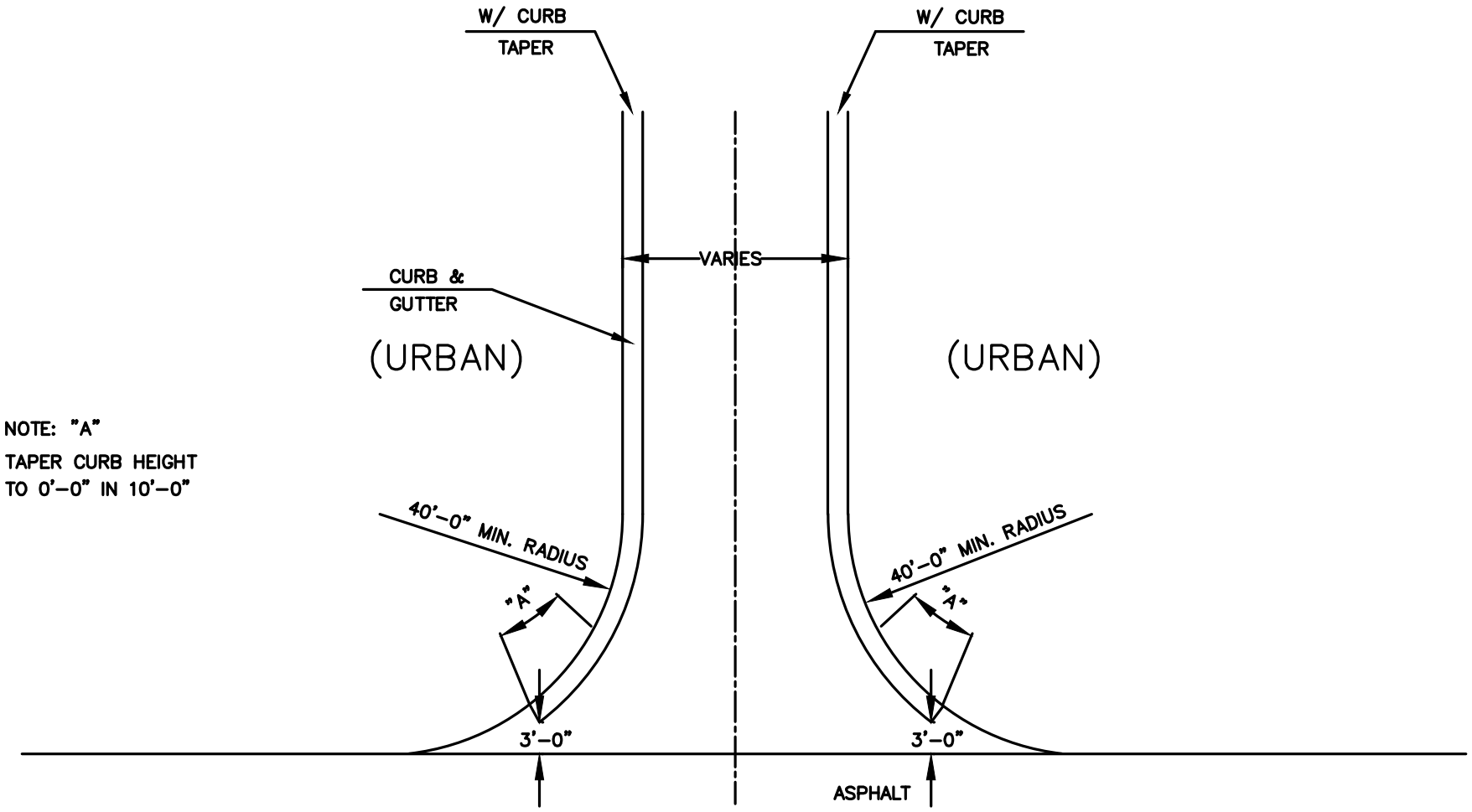
Inspection: All inspections must be scheluled at least 24 hours in advance. The inspection date and time must be established before any work begins. Call 732–7213, Monday – Friday, 8:00 a.m. – 4:30 p.m.



STANDARD INTERSECTION DETAIL

(LOCAL/RESIDENTIAL STREETS)

STD0025

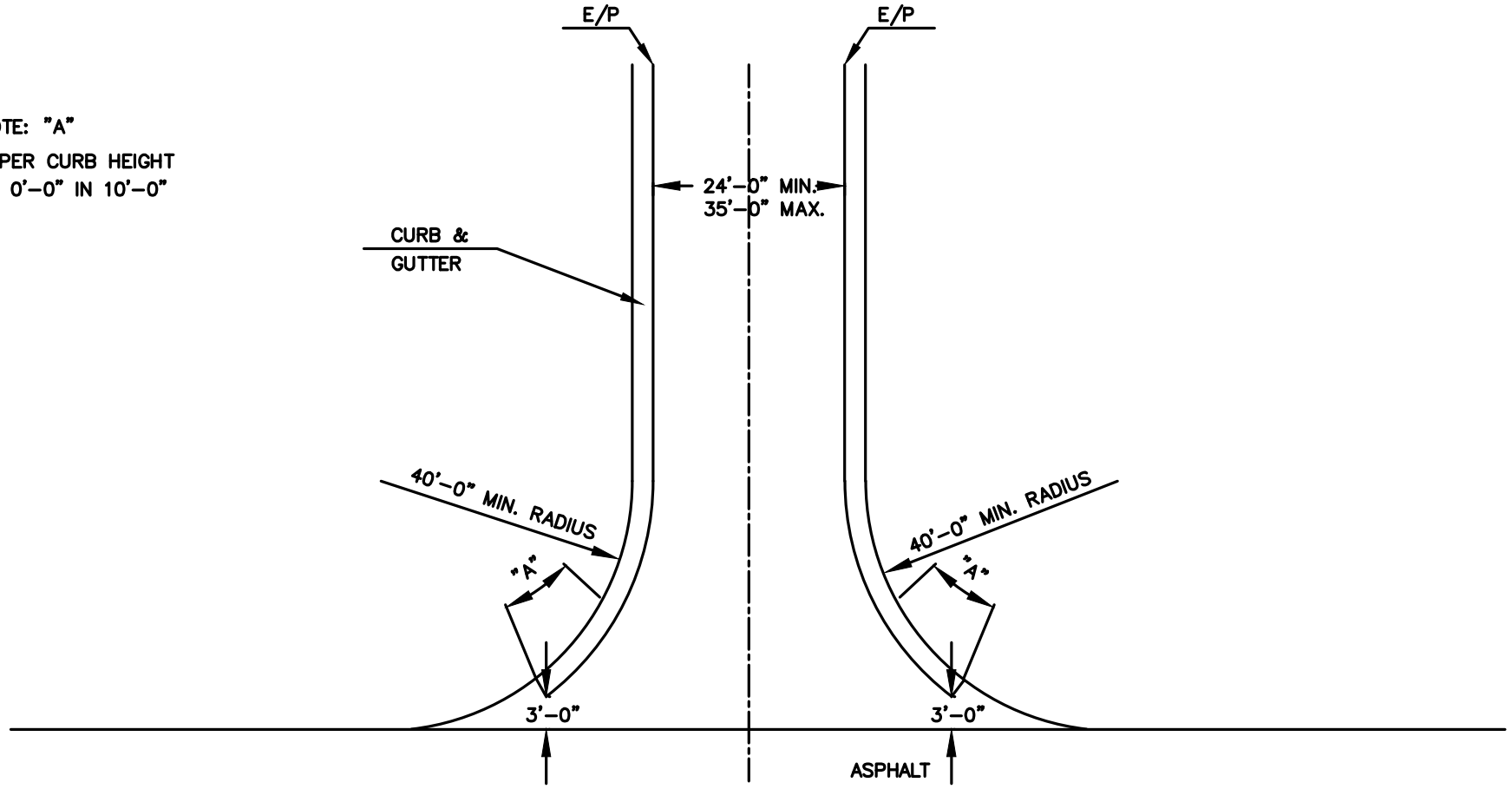


STANDARD INTERSECTION DETAIL

(COLLECTOR/COMMERCIAL/INDUSTRIAL STREETS)

STD0025A

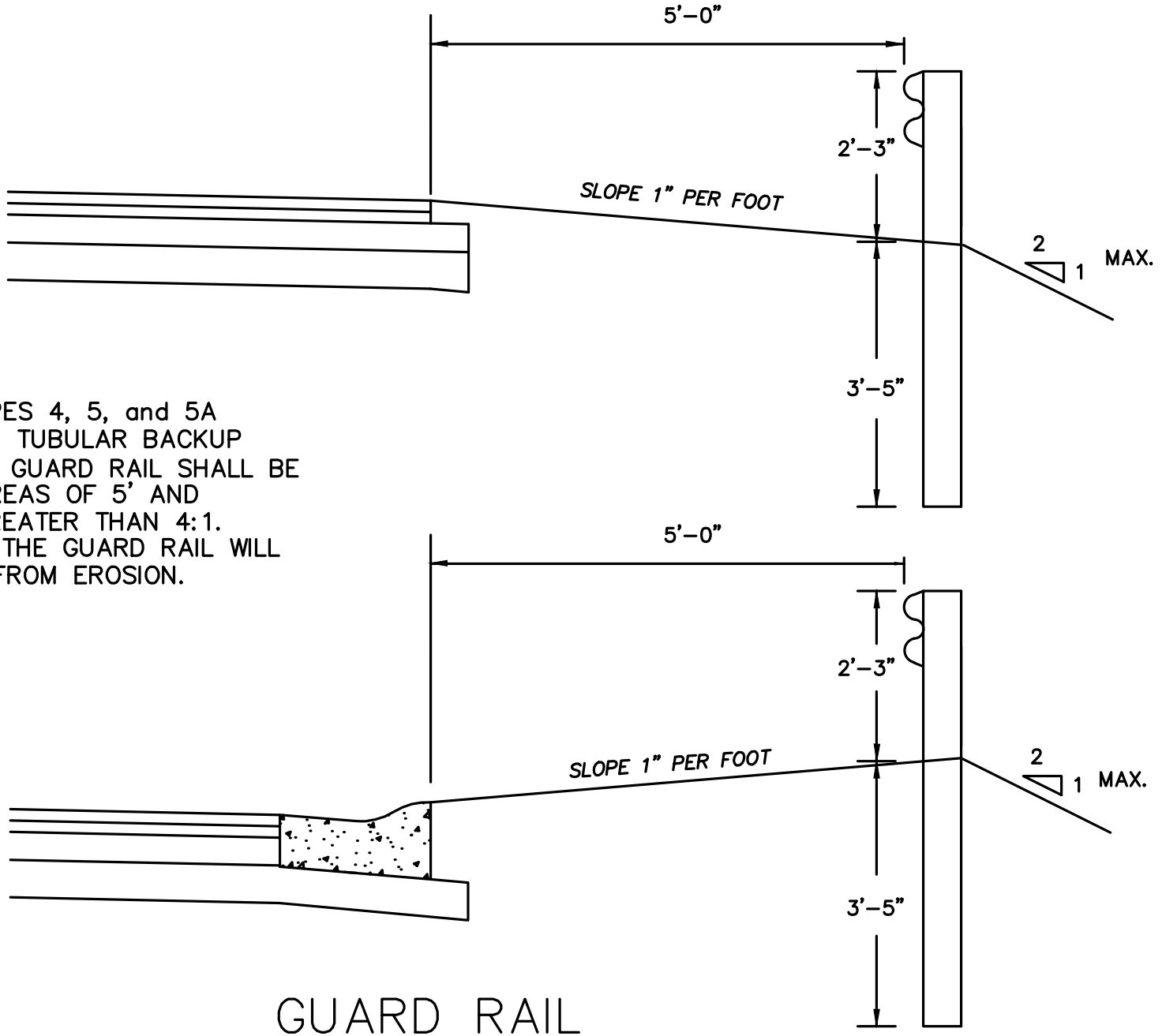
NOTE: "A"
TAPER CURB HEIGHT
TO 0'–0" IN 10'–0"



COMMERCIAL PROPERTY DRIVEWAY DETAIL

ENTRANCES ONTO EXISTING PUBLIC ROADS

STD0026



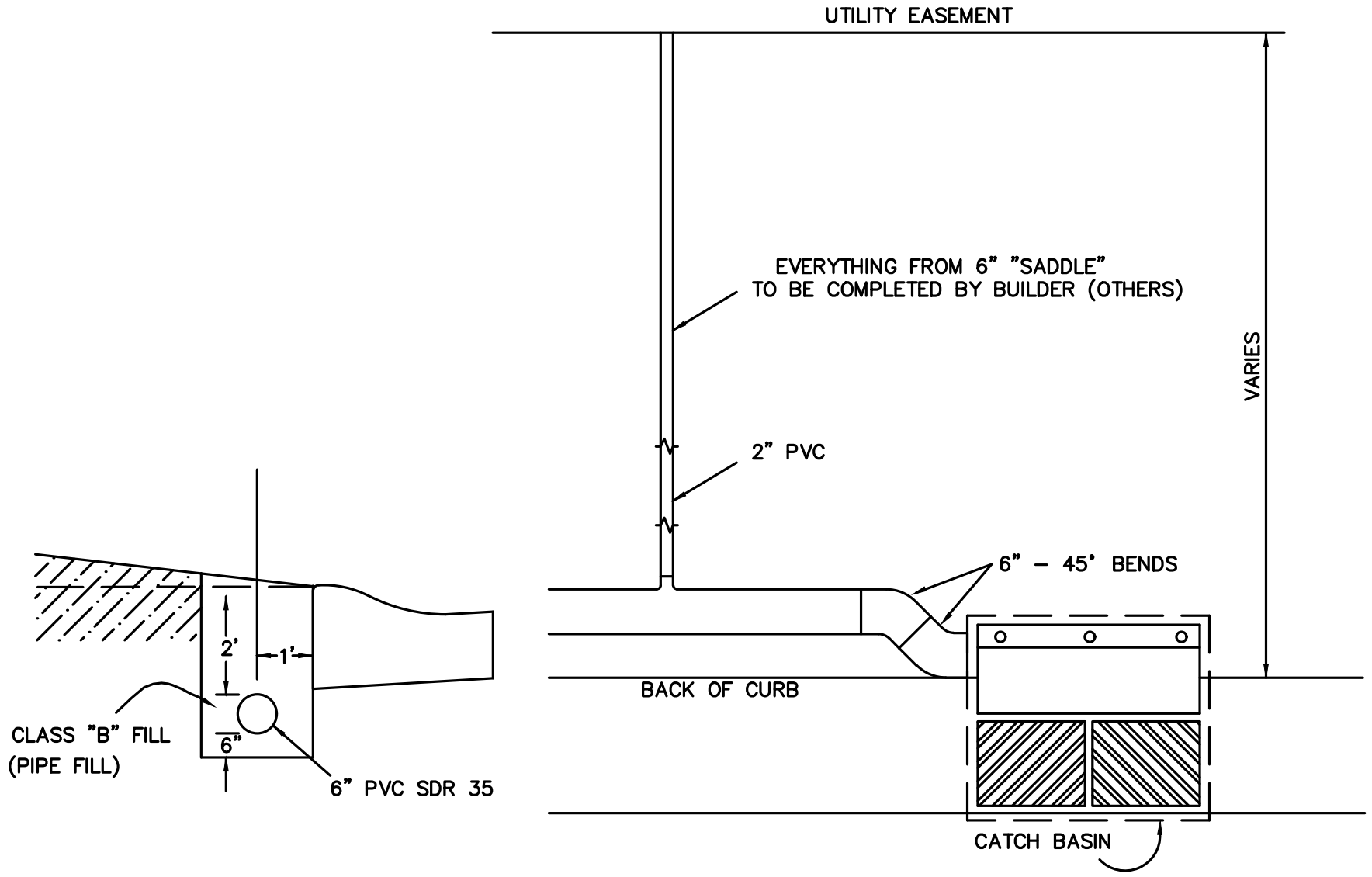
NOTES:

GUARD RAIL TYPES 4, 5, and 5A OR TYPE 5 WITH TUBULAR BACKUP ARE PERMITTED. GUARD RAIL SHALL BE USED IN FILL AREAS OF 5' AND WITH SLOPES GREATER THAN 4:1. SLOPES BEHIND THE GUARD RAIL WILL BE PROTECTED FROM EROSION.

GUARD RAIL

SCALE : 1" = 2'

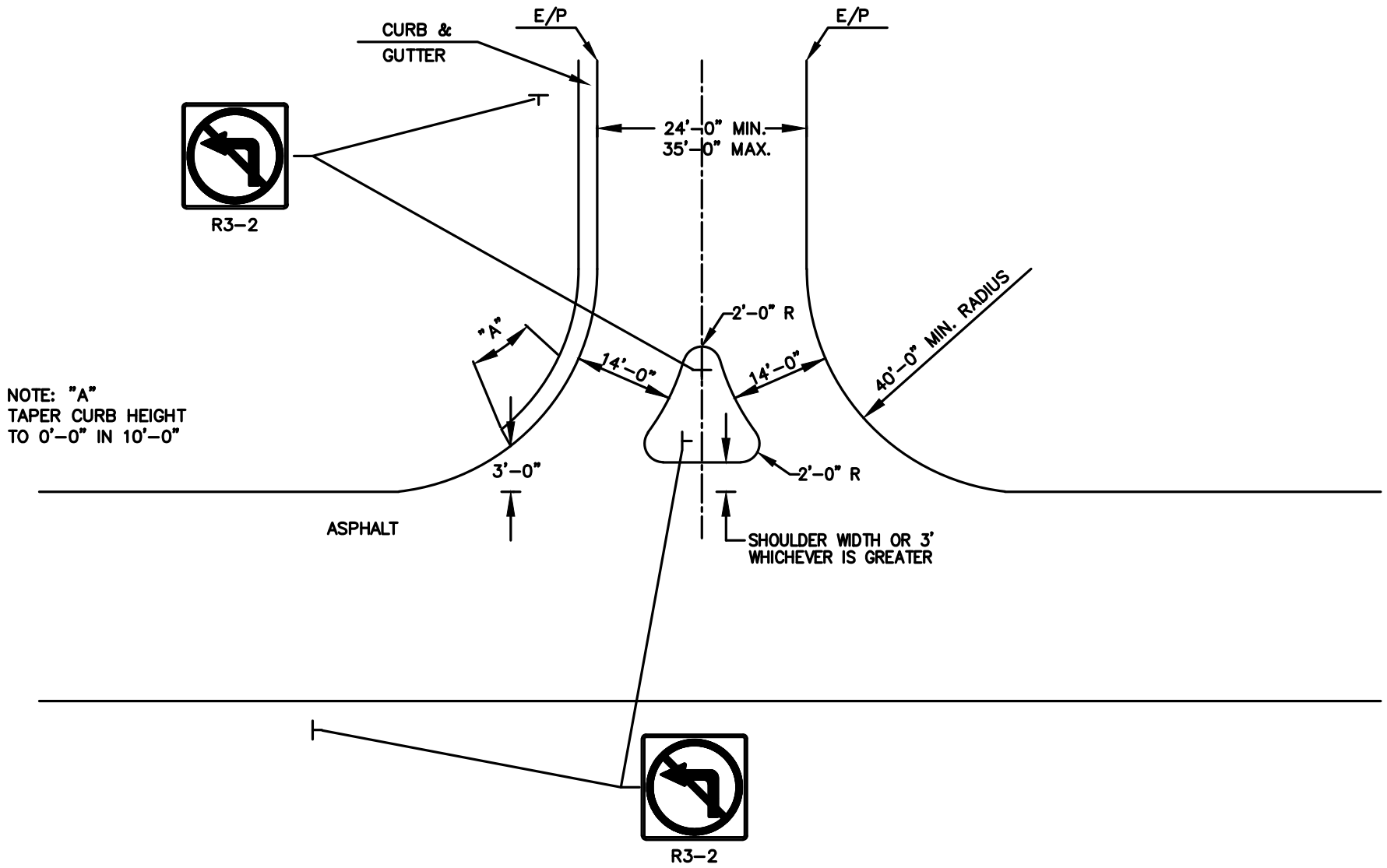
STD0027



SUMP PUMP
COLLECTOR LINE

STD0028

NOTE: ONLY THE APPROXIMATE LOCATIONS OF THE TURN PROHIBITION SIGN POSTS ARE SHOWN

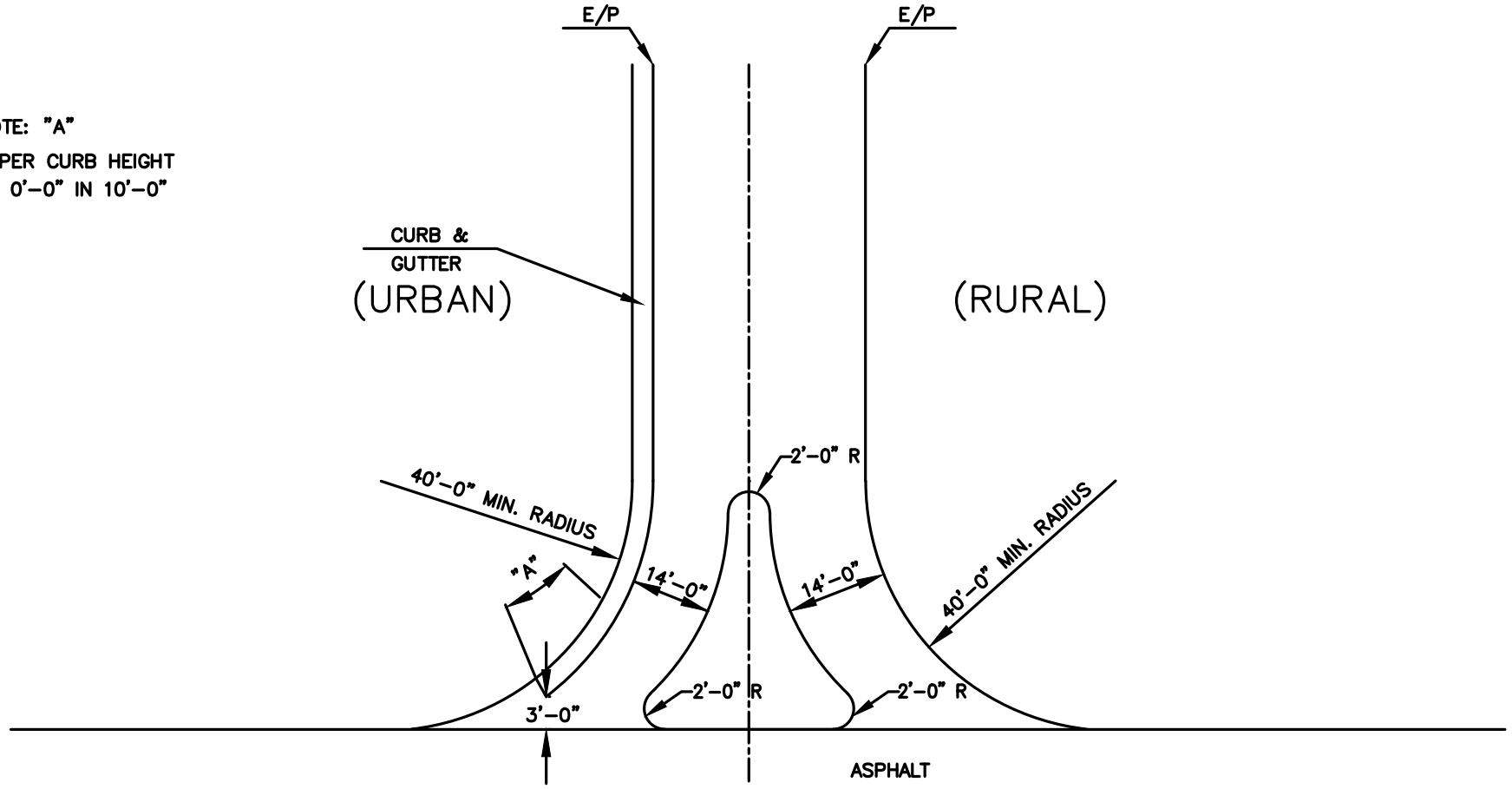


COMMERCIAL PROPERTY DRIVEWAY DETAIL

RIGHT IN/RIGHT OUT

STD0029

NOTE: "A"
TAPER CURB HEIGHT
TO 0'–0" IN 10'–0"



STANDARD INTERSECTION DETAIL

RIGHT IN/RIGHT OUT

STD0030

APPENDIX D

Village of Mt. Orab

Brown County, Ohio

Traffic Study Policy

TRAFFIC STUDY POLICY

A. PURPOSE AND INTENT

In some form or another, traffic touches every person who lives or works in Mt. Orab. Each development can have a cumulative affect on the capacity of the Village's roadway network.

It is a goal of the Planning Commission to preserve and manage the Village's roadway network more efficiently, to improve public safety, and to move people and goods efficiently and conveniently.

The purpose of this policy is to determine when a traffic analysis is necessary, to what level of analysis needs to be conducted, and what the criteria should be for each level of analysis.

B. APPLICABILITY

This policy should apply to all Major Site Plans, Zoning Map Amendments, Concept Plans/Change of Concept Plans, and Preliminary Plats.

C. LEVELS OF ANALYSIS

The Village of Mt. Orab Planning Commission shall use their judgment to determine if an analysis is necessary and to what level should be applied given existing and future conditions. The Planning Commission should use the following table in making its determination:

TRAFFIC GENERATED BY PROPOSED DEVELOPMENT (peak hour)	ANALYSIS LEVL
Less than 50 trips	No Analysis
50 - 75 trips	Traffic Analysis
75 - 100 trips	Intermediate Traffic Impact Study
More than 100 trips	Full Traffic Impact Study

D. SUBMITTAL REQUIREMENTS

Based upon the above table, the following requirements should be included as part of each analysis level:

1. No Analysis

a. Trip generation (peak hours) – To be calculated using the ITE Trip Generation Manual.

2. Traffic Analysis

   a. Trip generation (peak hours and 24-hour) - To be calculated using the ITE Trip Generation Manual
   b. Trip distribution – Trips generated by the development should be distributed onto the public street network consistent with existing traffic patterns in the area.
   c. Modal split – Trips generated by the development should be summarized between passenger vehicles and trucks

3. Intermediate Traffic Impact Study

   a. Trip generation (peak hours and 24-hour) - To be calculated using the ITE Trip Generation Manual and actual vehicle counts on the adjacent street(s).
   b. Trip distribution – Trips generated by the development should be distributed onto the public street network consistent with existing traffic patterns in the area.
   c. Modal split – Trips generated by the development should be summarized between passenger vehicles and trucks.
   d. Safety analysis – Should include sight distance analysis as well as a summary of crash trends and how the proposed development would impact those trends.

4. Full Traffic Impact Study

   a. Per the requirements of the Ohio Department of Transportation (ODOT).