# CITY OF MISHAWAKA, INDIANA

## David A. Wood - Mayor

# ENGINEERING STANDARDS 2022

## SPECIFICATIONS & DRAWINGS

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## STANDARD SPECIFICATIONS

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# SECTION I – GENERAL NOTES AND CONDITIONS

## I-1 PREVAILING SPECIFICATIONS

A. The City of Mishawaka Engineering Standards shall consist of these Standard Specifications and of the City of Mishawaka Standard Drawings, the current issue of the Indiana Department of Transportation Standard Specifications, the current issue of the Indiana Department of Transportation's Standard Drawings, and the current issue of the Indiana Manual on Uniform Traffic Control Devices for Streets and Highways. All other local, County, State, or Federal requirements and regulations shall also be adhered to. In the event of any conflict between the City of Mishawaka Engineering Standards and any other documents, the City of Mishawaka Engineering Standards shall prevail.

## I-2 ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

Whenever the following acronyms, abbreviations and terms appear, the intent and meaning shall be interpreted as provided under this Section.

A. AADT: Shall mean "Annual Average Daily Traffic."
B. AASHTO: Shall mean the "American Association of State Highway and Transportation Officials."
C. ADA: Shall mean the "Americans with Disabilities Act."
D. ANSI: Shall mean the "American National Standards Institute."
E. ASTM: Shall mean the "American Society for Testing and Materials."
F. AWWA: Shall mean the "American Water Works Association."
G. Board: Shall mean the Board of Public Works and Safety or any representative of the Board of Public Works and Safety
H. Bonded Excavator: Shall mean any contractor or representative who has a current and valid Excavation Bond on file with the City of Mishawaka Department of Engineering to excavate in public places
I. City: Shall mean the City of Mishawaka and/or designee as assigned by the issuing/permitting authority.
J. Department of Engineering: Shall mean the Director of Engineering or any representative of the Department of Engineering.
K. DIP: Shall mean "Ductile Iron Pipe."
L. Emergency: Shall mean any event which may threaten public health or safety, including, but not limited to, damaged or leaking water or gas conduit systems, damaged, plugged, or leaking sewer or storm drain conduit systems, damaged underground electrical and communications facilities, or downed overhead pole structures.
M. Engineer: Shall mean the City Engineer, the Director of Engineering or a designated representative.

N. Excavate: Shall mean to dig into or in any way remove or physically disturb or penetrate any part of a Right-of-Way.

O. Excavation (Right-of-Way Occupancy) Permit: An Excavation Permit shall be obtained from the Department of Engineering for any work completed within the right-of-way. This shall include but not be limited to the following: any type of excavation work, repair work on utilities both above and below grade, any work that requires any disruption to normal traffic flow, maintenance of traffic or lane closures.

P. Facility or Facilities: Shall mean any infrastructure component or tangible asset in the Right-of-Way required to provide utility service or means of transportation.

Q. HDPE: Shall mean "High Density Polyethylene."

R. High Volume Streets: Shall mean any street or road meeting ANY of the following criteria:

1. Traffic volume in excess of 10,000 AADT.
2. Pavement width in excess of 38 feet.
3. Number of lanes in excess of 2.
4. Right-of-Way width 60 feet or greater.
5. Special circumstances temporarily requiring major thoroughfare designation by the City (i.e., major construction along roadway, seasonal or special event, etc.)

S. IAC: Indiana Administrative Code

T. IDM: INDOT Design Manual

U. IDEM: Shall mean the Indiana Department of Environmental Management.

V. IDNR: Shall mean the Indiana Department of Natural Resources

W. INDOT: Shall mean the Indiana Department of Transportation.

X. IMUTCD: Shall mean the Indiana Manual on Uniform Traffic Control Devices for Streets and Highways.

Y. NEMA: Shall mean the "National Electrical Manufacturers' Association."

Z. Newly constructed, reconstructed, or rehabilitated streets: Shall mean any street that has been newly constructed, reconstructed, or rehabilitated within the past 5 years.

AA. OSHA: Shall mean the "Occupational Safety and Health Administration."

BB. PDF: Portable Document Format

CC. Permittee: Shall mean a person who has obtained a permit as required by this ordinance.

DD. Person: Shall mean any natural or corporate Person, business association or other business entity including, but not limited to, a partnership, a sole proprietorship, a political subdivision, a public or private agency of any kind, a utility, a successor or assign of any of the foregoing, or any other legal entity.

EE. Pole Placement: Shall mean any excavation associated solely with a single placement or replacement of a utility pole.

FF. Professional Engineer: Shall mean an engineer licensed and certified in the State of Indiana by the Indiana Professional Licensing Agency.

GG. PS: Pipe Stiffness

HH. PSI: Shall mean "Pounds per Square Inch."

II. Public Place: Shall mean any public street, way, place, alley sidewalk, park, square, plaza, or any other similar public property owned or controlled by the City and dedicated to public use, and any dedicated-but-unaccepted street or way.

JJ. PVC: Shall mean "Polyvinyl Chloride."

KK. RCP: Shall mean "Reinforced Concrete Pipe."

LL. Rehabilitation: Shall mean that activity of work on any street that provides structural improvement having a minimum service life of 10 years with minor maintenance, which includes pavement overlay of 1.5 inches minimum depth, and partial or full depth reconstruction.

MM. Right-of-Way: Shall mean the area on, below, or above a public roadway, highway, street, bicycle lane, and public sidewalk in which the City has an interest, including other dedicated Rights-of-Way for travel purposes and utility easements of the City. A Right-of-Way does not include the airwaves above a Right-of-Way with regard to cellular or other non-wire telecommunications or broadcast service.

NN. Rules & Regulations: Shall mean the Department of Engineering, through the Board of Public Works and Safety, shall establish rules & regulations governing street excavations and implementing this ordinance. The Director may delegate any or all of the duties hereunder.

OO. SDR: Shall mean "Standard Dimension Ratio."

PP. Standards: Shall mean the City of Mishawaka Engineering Standard Specifications and Standard Drawings.

QQ. Substructure: Shall mean the Department of Engineering, through the Board of Public Works and Safety, shall establish rules & regulations governing street excavations and implementing this ordinance. The Director may delegate any or all of the duties hereunder.

RR. Utility: Shall mean a public utility as defined in IC 8-1-2-1 and as it may be hereinafter amended and shall specifically include the non-regulated activities of such a utility.

SS. Utility Location: Shall refer to the "Indiana Underground Plant Protection Service" commonly known as "Holey Moley."

## I-3 AS-BUILT RECORD DRAWINGS

A. "As-Built" Record Drawings will be required on all improvements that are to be dedicated to and accepted by the City for inclusion in the public infrastructure; or will in any way impact any part of the existing public infrastructure. This shall include all utilities maintained by the City of Mishawaka, including but not limited to the following: sanitary sewers, storm sewers, traffic conduits and handholes, water main systems piping, irrigation, fiberoptic conduits, or other utilities that are constructed and maintained by the City of Mishawaka.

B. As-Built Record Drawings shall be provided to the Department of Engineering upon completion of and prior to the City's acceptance of the utility and the project.

C. As-Built Record Drawings shall be submitted on plan and profile sheets in digital format (AutoCAD), as well as typical hard copies. Two hard copies and one electronic copy on CD (with AutoCAD and PDF formats) shall be submitted.

D. As-Built Record Drawing Submittal Process

1. At the completion of construction, the Contractor shall submit preliminary As-Built Record Drawings along with a preliminary excel file of all new sewer structures to the Department of Engineering.
2. The submittal shall include a request for a series of structure numbers to be assigned to the new constructed structures. The excel file shall include the number of installed structures, including all sanitary manholes, storm manholes, combined sewer manholes, cleanouts, inlets, catch basins, dry wells, storm outfalls, force main air release valves, and electric or fiberoptic handholes, that require a new structure number. Each structure shall be provided with the following information:
   a. Mishawaka City ID (Blank)
   b. Structure ID
   c. Northing
   d. Easting
   e. Rim Elevation
   f. Structure Type
   g. Comments
3. The City of Mishawaka Sewer Department will have to complete a final inspection of all sewers installed and will provide the Contractor notification of any revisions or deficiencies.
4. The City will then provide the list of Mishawaka Structure Numbers.
5. The Contractor shall label each constructed structure with the new assigned Mishawaka 'number' for inclusion in the final As-Built Submittal for approval.

E. Requirements for "As-Built" Record Drawings:
1. Each as-built sheet must be signed and sealed by a Professional Engineer licensed in the State of Indiana.
2. All elevations shall be in the NAVD 88 (North American Vertical Datum) vertical datum.
3. Indicate the invert and casting elevations of all structures, i.e., manholes, catch basins, inlets, outfalls, etc. Casting elevations on catch basins and inlets will be shown at the flowline.
4. Indicate the percent of line slope between structures and/or between structures and stubs.
5. Indicate horizontal location of sanitary laterals and/or taps from the downstream manhole. See Sewer Tap As-Built Detail, I-2, of the Standard Drawings.
6. Indicate the length of the sanitary laterals and/or taps from mainline sewer including the elevation of the laterals at the property/right-of-way line and offsets if necessary. See Sewer Tap As-Built Detail, I-2, of the Standard Drawings.
7. Indicate the location of all structures i.e., manholes, catch basins, inlets, etc., by stationing.
8. All structures, i.e., manholes, catch basins, inlets, and outfalls shall also be located by Indiana State Plane; East Zone (NAD83) coordinates.

a. This can be done either by GPS (Global Positioning System) or by traditional survey methods with a horizontal accuracy of ±3 U.S. survey feet.
b. Location of manholes shall be the center of the manhole, casting locations for catch basins and inlets shall be at the flowline.
c. Coordinate information shall include ties to two known control monuments. Information for the City base station can be provided upon request.

9. As-Built Record Drawings shall indicate the locations of other existing utilities, including but not limited to communications and signals, fiberoptic, telephone, electric and water.
10. As-Built Record Drawings shall show all right-of way, easement, and property lines. When service taps have been installed, all property information shall be shown (i.e., lot #, address, property owner name).
11. Place a check mark (√)on the profile section of the sheet next to structure callouts, invert elevations, and/or line slope information that are installed per plan, e.g.:

√ MH #1 STA 1+00/10'RT, Line 'M'
√ 360 LFT – 30" sanitary sewer @ 1.00 percent

12. Any changes on horizontal and vertical location of sewers and any changes on percent of line slope must be shown on plan and profile sections.
13. Any revisions on the plans shall be noted and the area shall be bubbled, referenced to the revision table as an "As-Built" revision, and dated accordingly.
14. All information on "As-Built" or record drawings that are kept in the field or project site must be neat, concise, and legible. All the as-built information shall then be converted onto the drawings in a digital AutoCAD format.
15. Indicate the composition of pipe, i.e., PVC, FRP, PP, HDPE, etc., on profile section of sheet for each run. A "run" being a section of pipe between structures or between structures and stubs.
16. Any other information or data requested by the Department of Engineering personnel must be submitted if requested.
17. The final "as-built" or record drawings shall have a designated area on each sheet for the Contractor to place their certification including the seal and signature of a Professional Engineer licensed in the State of Indiana. The following is an example of an "As-Built" certification:

**AS-BUILT RECORD DRAWINGS**

I HEREBY CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THESE AS-BUILT RECORD DRAWINGS REPRESENT THE CONSTRUCTION IMPROVEMENTS AND UTILITY INSTALLATIONS COMPLETED FOR THE PROJECT.

CONTRACTOR (STAMP HERE)
ADDRESS
CITY, ST ZIP
PHONE

(SIGNATURE HERE) (DATE)
REGISTERED PROFESSIONAL ENGINEER

F. All projects contracted with the City of Mishawaka shall require the Contractor to have the "As-Built" or record drawings digitally drafted by the design engineer or consultant for the project. The costs associated with the digital conversion shall be paid to the design engineer or consultant by the Contractor.

## I-4 BOND REQUIREMENTS

A. An Excavation Bond is required for construction in the public right-of-way, easements, or other City properties. The Bond shall be posted to the Department of Engineering. This Bond is a calendar year bond and is the contractor's responsibility to provide continuations from year to year. This Bond is required to be current in order to obtain City permit to perform any excavation, or other work, in the public rights-of-way of the City.

B. An Erosion Control Bond is required for any significant land disturbance (greater than 1 acre) per the City of Mishawaka "Erosion Control Ordinance". The Erosion Control Bond shall be in the amount set forth in the ordinance, which is $3,000 per acre of land disturbance, up to 5 acres, and $1,500 for each additional acre of land disturbance thereafter or $0.50 per cubic yard of disturbed material, including both cut and fill.

C. A Subdivision Bond is required if a developer intends to commence with home builds prior to all infrastructure (utilities, subgrade, curbs, pavement, sidewalks, etc.) being completed. The Subdivision Bond amount shall be for 100% of the construction cost to complete the infrastructure. An Engineer's estimate or signed construction contract shall be provided to verify the amount.

D. Numerous arterial streets in the City are designated as "High Volume Streets" and require a Site Specific Bond. Included with this shall be a detailed drawing, with particularly close attention to maintenance of traffic. The Site Specific Bond shall be for a minimum $25,000. This bond is required in order to obtain any excavation permit on the "High Volume Streets" or as designated by the Engineer. Three business days are required for processing.

E. Maintenance Bond shall be provided by the Contractor that binds themselves to the City for the guarantee of the work, material, and conditions of the work completed for any improvements that are to be accepted by the City. The Maintenance Bond amount shall be 10 percent of the construction value or $25,000, whichever is greater. The Maintenance Bond shall be provided for a period of 3 years, from the date of Final Acceptance of such improvements.

F. Provide all required bonds, per the project specifications, for any work that is completed under contract with the City.

## I-5 PERMITS

All permits that are required for construction shall be the responsibility of the Contractor, unless otherwise indicated. The Contractor shall be responsible for complying with all conditions of said permits including any fees, payments, special bonding, inspection, or other requirements of the permits.

A. Permit fees are as set forth in the current City Code of Ordinances.

B. Obtaining and protecting utility locations are the sole responsibility of the Contractor.

C. Only bonded Contractors (Excavation Bond) shall be eligible to obtain a permit to perform any excavation, or other work, in the public rights-of-way of the City.

D. A Sanitary Sewer Construction Permit shall be obtained from the Department of Engineering prior to any work associated with the sewer. The sewer work shall include but not be limited to the following: any type of sewer excavation work, new sewer construction or connections, existing sewer repair work and sewer manhole connection or repair work.

E. An Excavation Permit (Right of Way Occupancy) shall be obtained from the Department of Engineering prior to any type of work within a City street or right-of-way. Work within the right-of-way that requires an Excavation permit shall include but not be limited to the following: any type of excavation work, repair work on utilities both above and below grade, sidewalk or driveway repair or replacement, major landscaping (including, but not limited to, retaining walls, tree plantings, and walkways) within or adjoining the right of way or parkway, any work that requires any disruption to normal traffic flow, maintenance of traffic or lane closures. In accordance with the City Ordinance a drawing(s) indicating all pertinent information regarding the work to be done (location, purpose, work area, trench width, length and depth, barricades, traffic maintenance plan, duration of work, etc.) shall be submitted to obtain such permit.

F. A Street Closure Request Form is required for any work that is performed within the City right-of-way that requires a street closure, lane restriction, sidewalk closure, or any other occupancy of the right-of-way that inhibits vehicular or pedestrian traffic. The Street Closure Request Form shall be submitted to the Department of Engineering at least 5 calendar days prior to the proposed closure for review and approval. The Street Closure Request Form shall be accompanied with a Traffic Control Plan that indicates location of closure, proposed barricades, signage, detour routes, etc. If approved, the Department of Engineering will issue an appropriate press release to inform the public of the closure. Any extended closure on a High Volume Street may require an electronic sign board be placed to better inform the public of the scheduled closure.

G. The construction of any new driveway or connection with any City street requires a driveway permit from the Department of Engineering. A detailed drawing indicating location of the driveway (distance from any intersection and existing driveways, adjacent and opposite) tapers or radii, the existing and proposed elevations and any other information necessary to properly show the proposed work is to be included on the drawing and become part of the permit.

H. A Dumpster Permit shall be required if a dumpster I needed to be placed in the public right-of-way. Placement of the dumpster shall be approved by the Department of Engineering. Curbs, sidewalks, and pavement are to be protected from damage by the dumpster. Barricades with flashers shall be provided and placed on each end of the dumpster.

I. Any work on a state Highway, or within State rights-of-way, requires a permit from the Indiana Department of Transportation, LaPorte District office. (e.g. Lincolnway, Capital Ave (SR 331), SR 23, etc.).

J. Comply with all federal, state, and local statutes, rules, regulations, and ordinances related to the proposed work. Obtain any Environmental permits deemed necessary including, but not limited to the following.

1. **IDEM Construction Stormwater General Permit** (previously 327 IAC 15-5, Rule 5) (Storm Water Runoff Associated with Construction Activity)
2. **IDEM 401 Water Quality Certification Permit** (Work within lakes, rivers, streams, and wetlands)
3. **IDNR Construction in a Floodway Permit** (Work within the floodway of any waterway)
4. **Army Corps of Engineers Section 404 Dredge and Fill Permit** (Discharge of dredged or fill materials into any Water of the US, including wetlands)
5. **IDEM Sanitary Sewer Construction Permit** (Construction, expansion, or modification of any sanitary sewer facility)

K. Obtain any permit required for storm water run-off associated with construction activity and develop, implement, and maintain a storm water management plan consistent with the requirements IDEM Construction/Land Disturbance Storm Water Permitting and requirements of the IDEM Construction Stormwater General Permit (previously 327 IAC 15-5, Rule 5). Obtain a local erosion control permit and submit erosion control plan, if required, in accordance with City ordinance and Section X - Erosion Control.

L. Any work on or near City streets requires a Maintenance of Traffic plan consistent with the requirements of Section VIII - Traffic.

M. Any work within railroad right-of-way shall be in accordance with the specifications and requirements of the railroad having jurisdiction. The Contractor is responsible for coordinating with the railroad and must have all applicable railroad permits approved prior to performing work.

## I-6 SAFETY REQUIREMENTS

A. Contractor shall follow all OSHA regulations and comply with all federal, state, and local codes and regulations. Any conflict between agencies, the most restrictive requirements and regulations shall prevail.

B. Contractor shall have notices posted in prominent locations showing emergency telephone numbers etc., as required by law.

C. Provide temporary fire extinguishers as required by law.

D. Provide first-aid kit as required by law.

E. Contractor shall be responsible for all protection of persons and property in the construction area.

F. If required, a Health and Safety Plan shall be submitted and on file with the City.

## I-7 CLEARING OF RIGHT-OF-WAY OR EASEMENTS

A. Clearing of Right-of-Way or Easements shall consist of clearing, grubbing, removing, and disposal of all vegetation and debris within the limits of the Right-of-Way or Easement. Burning is not permitted.

B. All existing trees and vegetation that are noted as to remain shall be protected.

C. Any damage to the natural habitat, vegetation, or objects designated to remain shall be repaired, replaced, or compensated for by the Contractor for no additional payment.

D. Contractor shall obtain approval from the City of Mishawaka prior to the cleaning, removal, and disposal of any objects within the right-of-way, easements, or City owned property unless noted as such.

E. Contractor shall protect all established property corners, survey markers, and section corner monuments. If any of these are disturbed or removed, they shall be reestablished. Section corners that are disturbed or removed shall be reset per Detail I-3 of the Standard Drawings.

F. Topsoil Stripping and Stockpiling
   1. Stockpile topsoil in areas that are approved by the City of Mishawaka.
   2. Dispose of unsuitable or excess topsoil per all local, State and Federal regulations.
   3. Provide erosion-control measures for all stockpile areas to prevent soil erosion and discharge of soil bearing water runoff to adjacent properties and walkways.

## I-8 EXCAVATION

A. Emergency Excavation - The Department of Engineering is to be notified as soon as possible in the event of any emergency excavation, followed by a permit application.

B. Initial Excavation
   1. The Contractor is responsible for the placement of all safety lighting, barricades, and warning signs.
   2. Initial access hole shall be cut only as large as required to perform work.

C. Any excavation undertaken or authorized by this ordinance shall comply with all the requirements per the Indiana Code.

## I-9 COMPACTION REQUIREMENTS

A. The minimum soil compaction requirements for backfill material and pavement subgrade will be as indicated below. The moisture content shall be controlled within -2 and +1 percentage points of optimum moisture content. Maximum density and optimum moisture content shall be determined in accordance with the standard Proctor test ASTM D-698 and AASHTO T 99 using method A for soil and method C for granular materials.

| | |
|---|---|
| Subgrade under pavement and curbs | 100% |
| Topsoil used in all but the top six inches (6") of fill | 90% |
| Existing ground receiving fills. | 95% |
| Backfill in pipe and conduit trenches under pavements and curbs. | 95% |
| All other areas receiving fill. | 95% |

B. Compaction Testing Frequency

1. A minimum of one compaction test will be required on the backfill for each sewer pipe and water main pipe transverse run that is under the pavement or concrete curb. A minimum of three compaction tests will be required on the backfill for sewer pipe or water main pipe run. A pipe run is the length between structures or valves.
2. A minimum of one compaction test will be required per 500 square yards of roadway, per lift of earth fill or subgrade. The minimum number of tests is 10 each.
3. Compaction test locations shall be selected by the Department of Engineering.

## I-10 PROTECTION OF EXISTING UTILITIES

A. The Contractor shall be responsible to locate, protect, and maintain existing utilities during construction.

B. Notify the City of Mishawaka and their representatives not less than two days in advance of any proposed utility interruptions.

C. Contact Indiana Underground Plant Protection Service (IUPPS) at 1-800-382-5544 for utility location services for the construction project area a minimum of three working days prior to any excavation. This does not relieve the Contractor of notifying utility owners who may not be part of the IUPPS alert system.

D. Demolish and remove completely any underground utilities indicated to be removed. Coordinate with the utility companies to shut off services if lines are active.

E. All existing utility lines that are to remain shall be protected. Contractor shall repair or replace any utilities that have been damaged or broken during construction. The repair or replacement shall be of the same type and size encountered and the cost for any such repairs or replacement shall be the responsibility of the Contractor.

## I-11 TRENCHING LIMITS

A. Excavate trenches to indicated gradients, lines, depths, and elevations, as noted on the plans.

B. Excavate trenches to allowable widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

C. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

## I-12 SURVEY AND EASEMENTS

A. Surveys - Projects that require surveying for the design, construction, or utility approval within any public rights-of-way, easements, or other City property shall follow these procedures:

1. The property owners/residents shall be notified if survey crews need to have access to private property
2. The Contractor or survey crews shall have full responsibility to repair any damage to public or private property during their field work.
3. Project control points (temporary control points) shall be established with horizontal and vertical coordinates.
4. All control points shall be set based on documented control points or verified property monuments.
5. Trees shall not be used for surveying markers or control points.

B. Easements - All utilities that are to be owned and operated by the City shall be located within a roadway right-of-way, utility easement, or City owned property. Utilities will not be accepted by the City unless it is located within these parameters. If a utility cannot be installed within existing rights-of-way or easements, then the acquisition of an easement for the utility will be required. If the installation of utilities within existing rights-of-way or easements requires access to private properties, then a temporary construction easement will be required. It is the responsibility of the Utility to obtain all required easements, both permanent and temporary.

C. Permanent Easements - A permanent easement is a recorded easement, that is either platted or in an easement agreement, that will allow the right to construct, operate and maintain a utility within the limits of the defined areas. The permanent recorded easement shall designate the utility or utilities that will be located within the easement.

D. Temporary Construction Easement - A temporary construction easement will allow for a specific area of property to be used and accessed for a limited time for construction related work.

E. Easement Requirements -
   1. All easements shall be appropriately sized for the intended utility(s) to be installed.
   2. Easements that are submitted for approval shall be established based upon a boundary land or location control route survey.
   3. Easement plats shall be provided for each parcel on which the proposed easement will be located.
   4. The proposed easement document shall be prepared and signed by a Professional Surveyor registered in the State of Indiana.
   5. All proposed utility easements shall be approved by the City prior to final recording.
   6. All construction plans shall show the location of permanent and temporary easements.

## I-13 PEDESTRIAN FACILITIES REPLACEMENT REQUIREMENTS

A. All work performed within the City Right-of-Way that includes new construction, rehabilitation or replacement of any pedestrian facilities shall follow these Standards.

B. Protection of existing utilities and adjacent facilities shall meet the requirements of these specifications.

C. The subgrade preparation and compaction requirements shall be per Section IV-Pavement.

D. Curb ramps and sidewalks shall meet the requirements of Sections III-2 and III-3,

E. All proposed and temporary pedestrian facilities shall follow the most current version of the Americans with Disabilities Act (ADA) and the 'Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG).
   1. The PROWAG provides design guidelines for public streets and sidewalks, including pedestrian access routes, street crossings, curb ramps and blended transitions, on-street parking, street furniture and other elements.
   2. The PROWAG address access that accommodates all types of disabilities, including mobility and vision impairments, which take into account conditions and constraints that may impact compliance such as space limitations and terrain.

F. Provide temporary pedestrian traffic control during construction. Controls at minimum shall include:
   1. Signage indicating appropriate detour around area under construction and advance notification of closures ahead.
   2. Maintenance of sidewalks adjacent to work areas clear of debris, equipment, and materials and free of trip hazards.

G. For larger and longer duration utility construction projects, refer to and follow 'Pedestrians Checklist and Considerations for Temporary Traffic Control Zones' developed by American Traffic Safety Services Association (ATSSA).

## I-14 DVD RECORD AND PHOTO JOURNAL

A. Any work completed within the City Right-of-Way may require a video record and/or photo journal. Contact the Department of Engineering to determine if a video record or photo journal is required. All work contracted with and completed for the City will require a video record and photo journal.

B. All work to complete the video record and the photo journal shall be completed by a professional photographer or videographer. Any submitted video or photography that lacks professional quality will be required to be re-shot using a business that specializes in construction documentary video/photography.

C. One original and one copy of both the DVD and the Photo Journal shall be forwarded to the Department of Engineering for review prior to beginning construction and shall become the property of the City.

D. All DVD's shall be labeled with the name "City of Mishawaka" and the name of the Contractor. The photo journal shall be in color and professionally labeled showing the name "City of Mishawaka" and the name of the Contractor.

E. The Contractor shall keep one copy of both the DVD and the Photo Journal for their records.

F. The Video Record shall be submitted in a DVD format, professionally completed video recording of the entire project area to clearly show all features located within and adjacent to the right-of-way. This includes driveways, sidewalks, street pavements, nearby building foundations, retaining walls, landscaping, encroachments in the right-of-way, shrubs, trees, fences, etc., prior to the start of construction. The DVD shall include close-ups of the foundations of each structure located adjacent to the right-of-way. The DVD shall cover three sides of the foundation, the side adjacent to the right-of-way and the two sides perpendicular to the right-of-way. Audio identification shall be included to describe each property, i.e., "You are seeing 200 E. Main Street the east side of the property" also every effort shall be taken to give some visual reference of each shot (panning to an address or street sign). The camera work must be reasonably stable (the use of a tripod may be necessary). The recording shall include a time and date code displayed at one corner of the screen.

G. The Photo Journal shall be made of as many pictures as necessary to clearly show all visible cracks, foundation faults, and sidewalk and driveway cracks of each adjacent property. A minimum of 1 picture shall be provided for each of the 3 sides of the structure or foundation to show the existing condition. All fences, trees and landscaping shall be included in at least 1 of the photos. Photographs shall be made with a digital camera with at least 6 megapixels. Photographs shall be in color, 8-inch x 10-inch (8"x10") with a tape or scale to provide registration of photograph for any existing damage. Photographs shall be taken in sufficient lighting to provide high quality details. Photographs shall include the date taken in one corner and an address or location identifier label. The photos for a specific address and location shall be in its own folder.

H. If any existing conditions, abnormalities, or defects exist prior to construction they shall be well documented. Documentation may require conclusive visual evidence (i.e., physical measurement of an existing crack in video record or photograph).

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# SECTION II – ROADWAY GEOMETRICS

## II-1 DESIGN REQUIREMENTS

A. Design of streets, walkways, and paths shall comply with these City of Mishawaka Engineering Standards, the current version of the Indiana Department of Transportation Design Manual (IDM), American Association of State Highway and Transportation Officials Policy on Geometric Design of Highways and Streets (AASHTO), the Americans with Disabilities Act (ADA), and the United States Access Board Public Right-Of-Way Accessibility Guidelines (PROWAG).

B. The arrangement, character, extent, width, grade, and location of all streets shall be correlated to existing and planned streets, existing topography, public safety, and in appropriate relation to the proposed uses of the land to be served by the streets.

## II-2 STREET CLASSIFICATION

A. Typically, street classification in the City of Mishawaka is based upon the context of the area served by the street and the amount and type of vehicular traffic. As the purpose of the street transitions from transit to commercial to residential, the classification and associated design criteria for the street also changes. Following are the classification of streets to be used with-in the City of Mishawaka.

| **Classification** | **Definition** | **Lanes** | **Speed (mph)** |
|---|---|---|---|
| Arterial, Major | Serve major centers of activity, have the highest traffic volume, and service a large geographic area | 5 | 30-40 |
| Arterial, Minor | | 3-4 | 30-40 |
| Collector | Used to carry traffic from local streets to arterials, including the principal entrance streets to a residential development and circulation streets within such developments | 2-3 | 30-35 |
| Local | Used primarily for access to the abutting property | 2 | 25 |
| Service | Streets which are parallel to and adjacent to arterial streets and highways, which provide access to abutting property and protection from through traffic | 2 | 25-30 |
| Alley* | Minor ways which are used as a convenience primarily for public utility service at the rear or side of properties otherwise abutting on a street | 1 | 15 |

*New Alleys are prohibited (Municipal Code Sec. 133-43)

B. High Volume Streets: Shall mean any street or road meeting ANY of the following criteria:
   1. Traffic volume in excess of 10,000 AADT.
   2. Pavement width in excess of 38 feet.
   3. Number of lanes in excess of 2.
   4. Right-of-Way width 60 feet or greater.
   5. Special circumstances temporarily requiring major thoroughfare designation by the City (i.e., major construction along roadway, seasonal or special event, etc.)

C. Cul-de-sacs shall be short local or service streets of not more than 600 feet in length terminated by a vehicle turnaround.

## II-3 TYPICAL SECTION

A. The typical roadway section for any given classification plays an integral role in achieving the desired functionality of a street. Vehicle speed, traffic volume, parking opportunities, and space available for various amenities are all closely tied to the street typical section. Standard Drawing IV-1, Typical Sections defines the desirable typical section for each street classification within the City:

## II-4 HORIZONTAL GEOMETRY

A. Horizontal alignment and curvature of all roadways shall comply with the IDM and AASHTO's design guidelines for Low Speed Urban Streets.
B. Superelevation is not desired within the City and an effort shall be made to design roadways that use a normal crown section. If a superelevated section is used, it should typically have a maximum rate of four percent (4%).
C. Local streets shall be laid out so that their use by through traffic will be discouraged.

## II-5 VERTICAL GEOMETRY

A. Vertical alignment and curvature of all roadways shall comply with the IDM and AASHTO's design guidelines for the appropriate classification of the roadway.

## II-6 ROADSIDE SAFETY

A. All facilities, curbed and uncurbed, shall comply with the AASHTO Roadside Design Guide. A clear zone appropriate for the traffic volumes, design speed, and facility type shall be provided if practical.

B. Streets within the City are generally curbed, have design speeds less than fifty (50) mph, and have restrictive Right-of-Way. AASHTO makes provisions for curbed facilities, recommending obstructions be located as far from the traveled way as possible. At a minimum, roadside obstructions shall be three (3.00) feet behind the face of curb at intersections and driveway openings, and one and one-half (1.50) feet behind the face of curb elsewhere.

## II-7 APPROACHES

A. All new and reconstructed drives shall comply with Section IV – Pavements, of these Standard Specifications, for the Preparation of Subgrade Concrete Pavements.
B. Construct driveway per Details II-1, II-2, II-7, II-8, II-9, and II-10 of the Standard Drawings.
C. The minimum and maximum width of driveways shall comply with Details II-7 through II-10 of the Standard Drawings.
D. New drives constructed in areas of existing roads with curb and gutter are required to maintain the existing gutter line through the limits of the drive by depressing the existing curb, as shown in Detail II-2 of the Standard Drawings. The gutter shall run continuously through the drive approach.
E. In areas of new road construction, depressed curb shall be installed through the limits of all drives, as shown in Detail II-2 of the Standard Drawings. The gutter shall run continuously through the drive approach.
F. Expansion and contraction joints are required.
G. Grade control shall be set by one of the following methods:
    1. Using a string line, set grade stakes at a minimum of 25 feet on center.
    2. Using a laser, set grade stakes at every grade break.
H. Provide additional control to ensure forms are placed such that positive drainage by gravity flow will be obtained.

## II-8 DECELERATION LANE/PASSING BLISTERS

A. A Deceleration Lane shall be required for the following:
    1. Any 2-lane road with >5,000 AADT,
    2. 4-lane roads with >10,000 AADT,
    3. Or as required by the Engineer.
B. Construction of deceleration lanes and passing blisters shall be per the Standard Drawings.
C. All Deceleration Lanes and Passing Blister pavements shall match the existing, adjacent pavement type and section.

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# SECTION III – CURBS, CURB RAMPS, AND SIDEWALK

## III-1 CURB AND GUTTER

A. Backfilling curbs and gutters:
   1. Shall not begin until after concrete has cured for 72 hours.
   2. Shall match the surrounding grade and be reseeded or sodded.

B. Contractor must remove any damaged section of curb to the nearest joint.

C. Drainage outlets such as roof drains or underdrains are prohibited at the curb.

D. Restoration of street pavement areas damaged by curb removal shall be restored to the existing material and thickness.

## III-2 CURB RAMPS

A. Concrete curb ramps, including flared side and rolled edges where used, shall be 6-inch concrete. All work and materials related to the construction of curb ramps shall be in accordance with the current INDOT Standards Specifications.

B. Curb ramps located at intersections shall be constructed in accordance with the Mishawaka Standard Drawings, or the Americans with Disability Act of 1990 (and any supplements thereto) (ADA), whichever is more restrictive.

C. Detectable warning panels shall be installed for any new construction or reconstruction of curb ramps where the curb ramp, landing, or blended transition connects to a street. Curb ramps located at any other location other than intersections (such as at driveways) shall be constructed per Standard Drawings without detectable warning panels.

D. Detectable warning panels shall be a vitrified polymer composite (VPC) cast-in-place detectable/tactile warning surface tile with truncated domes as manufactured by Armor Tile or approved equal. The detectable warning panel shall be installed in accordance with the manufacturer's recommendations. The acceptable colors for detectable warning panels will include:
   1. Colonial Red (Federal Color No. 20109)
   2. Or other visually contrasting color as approved by the Department of Engineering.

E. The detectable warning surface shall be located so that the distance to the near edge of the curb line is 6-inch minimum and 8-inch maximum and shall extend 24 inches minimum in the direction of travel. Detectable warning surface shall extend the full width of the curb ramp exclusive of flares.

F. The bottom edge of the curb ramp shall be flush with the edge of the adjacent pavement.

G. Landings at the top of curb ramps shall have a maximum cross slope of 50:1 in any direction. When the site prevents construction of a landing area of 50:1 in any direction, the slope perpendicular to the curb face shall not exceed 50:1.

H. The minimum width of curb ramps shall be four (4) feet or per the current ADA requirements.

I. No mid-block ramps are permitted.

J. Gratings, access covers, and other appurtenances shall not be located on curb ramps, landings, or blended transitions.
K. All curb ramps shall require detailed spot elevation plans to verify compliance with accessibility requirements.
L. If allowable, all storm water inlets shall be placed upstream of curb ramps.

## III-3 SIDEWALK

A. Sidewalks shall be constructed in accordance with the Mishawaka Standard Drawings, or the Americans with Disability Act (ADA) of 1990 (and any supplements thereto), whichever is more restrictive.
B. Expansion joints are required at intervals not to exceed 50 feet for 5 feet sidewalk.
C. Placement of expansion joints are required for sidewalk around utility poles which may project out into the sidewalk, around hydrants and manhole frames, walls, and between sidewalk and buildings abutting said sidewalk.
D. A 4’-0” minimum clear sidewalk shall be maintained around any obstructions within the sidewalk.
E. Sidewalks shall have a minimum thickness of 4”. Sidewalk thickness shall be a minimum of 6” through residential driveways and a minimum of 8” through commercial driveways.
F. Sidewalk panels adjacent to driveway approaches shall be a minimum of 6” for residential driveways and a minimum of 8” for commercial driveways.
G. Where sidewalk is being replaced, sawcut and join the walk to the nearest joint of the existing improvements. If existing adjacent concrete slabs not scheduled for replacement are damaged by the Contractor’s operation, the Contractor shall replace the concrete to the next joint at no cost to City. Repair or removal of any panel of sidewalk shall be removed to the nearest joint regardless of property line.
H. Sidewalks shall have a maximum cross slope of 2% and a maximum running slope of 5%. Consult with the Engineer for roadways with an existing grade greater than 5%.
I. Where sidewalks extend through driveways, the running slope of the sidewalk shall not exceed 2%.
J. Where sidewalks turn corners, a level (2% max in any direction) turning area must be provided with 4’x4’ minimum dimension. This area may overlap with curb ramp landings.

## III-4 MISCELLANEOUS CONCRETE

A. All work and materials related to the construction of driveways, sidewalks, curb and gutter, and curbing are to be in accordance with the current INDOT Standards Specifications.

# SECTION IV - PAVEMENT

## IV-1 PREPARATION OF SUBGRADE

A. The subgrade shall be shaped to the required grade and sections, free from all ruts, corrugations, or other irregularities, and uniformly compacted and approved in accordance with INDOT Standard Specifications.
B. Surfaces on which a mixture is placed shall be free from objectionable or foreign materials at the time of placement.
C. If unsuitable soils are encountered, they shall be addressed in accordance with the INDOT Standard Specifications or as required by the City Engineer.
D. Preparation of subgrade shall be in accordance with these Standard Specifications Section I-8 and I-9.

## IV-2 ASPHALT PAVEMENTS

A. All materials are to be in accordance with the current INDOT Standard Specifications and also in accordance with the latest Asphalt Pavement Association of Indiana, Inc. (APAI) recommended guide specification for local governments.
B. The contractor shall submit a job mix formula for approval 5 working days prior to any mix placed. The contractor will not be allowed to proceed with the placement of asphalt without an approved job mix formula. The contractor shall notify the city 48 hours prior to placing any asphalt.
C. The HMA shall be supplied from a certified HMA plant in accordance with ITM 583 - Certified Volumetric Hot Mix Asphalt Producer Program. The HMA shall be transported and placed in accordance with the current INDOT Standard Specifications.
D. If the Engineer requests pavement cores, the Contractor shall, within one workday, clean, dry, and refill the core holes in accordance with Standard Specification Section IV-4, Bore Hole Restoration.

## IV-3 CONCRETE PAVEMENTS

A. All materials are to be in accordance with the current INDOT Standard Specifications.
B. Fly Ash May Be Used in Concrete Mix in Accordance with the INDOT Standard Specifications.
C. Pavement joints shall be in accordance with the current INDOT Standard Specifications.
D. Cold Weather Concrete Protection
    1. Contractor will assume full responsibility for placing concrete and for all damage caused by freezing.
    2. Do not place concrete on frozen subgrade materials.

3. When air temperature is at or below 40 degrees Fahrenheit and decreasing placement of concrete shall be discontinued and cannot begin again until the air temperature has reached 35 degrees Fahrenheit and is rising.
4. The contractor shall provide the necessary equipment and materials to prevent the concrete from freezing prior to attaining opening to traffic strengths, in accordance with INDOT Standard Specifications.

E. Protection
1. Protect concrete work against injury from elements and defacement of any nature, including vandalism during construction operations.
2. Provide protection of placed concrete from vandalism, wind, temperature extremes, and loss of moisture.
3. Do not permit concrete to freeze. Protect by covering with insulated blankets.
4. Remove and replace any damaged concrete as directed by the Engineer.

F. Immediately after the finishing operations, the entire surface of the newly placed concrete shall be covered and cured in accordance with INDOT Standard Specifications. Usually a white pigmented curing compound is utilized and is preferred by the City.

G. Utilize signs, barricades, flag persons or any other equipment and personnel to make safe construction areas within the City right-of-way, in conformance with current IMUTCD standards.

H. Removals
1. All excavated areas shall be protected at all times.
2. Disposal of debris resulting from clearing or removal operations shall be removed from site immediately to an off-site area.
3. No stockpiling or on-site containers will be allowed.

I. If the Engineer requests pavement cores, the Contractor shall, within one workday, clean, dry, and refill the core holes in accordance with these Standard Specifications, Section IV-4, Bore Hole Restoration.

## IV-4 PAVED STREET PATCHING

A. Bore Hole Restoration
1. All bore holes made in any existing pavement, for soil investigation or pavement coring, shall be restored in accordance with Detail IV-5 of the Standard Drawings.

B. Temporary Patch
1. If conditions do not allow the placement of a permanent concrete patch, a temporary asphalt patch shall be allowed. Temporary patches shall be a minimum depth of 4-inches for Local and Collector Streets and a minimum depth of 8-inches for Arterial Streets.
2. When a temporary patch is to be in place for more than 24 hours the permittee shall furnish the Department of Engineering with the name and phone number of the party responsible for after-hours maintenance.

C. Flowable Backfill

1. Shall be a workable mixture with the following properties:

| | |
|---|---|
| Minimum Unconfined Compressive Strength at 28 days | 50 psi |
| Maximum Unconfined Compressive Strength at 28 days | 150 psi |
| Minimum Fill Spread Diameter at time of placement | 8” |

2. Flowable Backfill shall not be subject to load nor disturbed by construction activities until the penetration resistance testing, in accordance with INDIANA TEST METHOD (ITM) 213, meets the following requirements:

| | |
|---|---|
| Concrete Pavement | 70 psi |
| All Other Applications | 1200 psi |

3. Do not place on frozen ground.
4. Protect from freezing until material has set.
5. Do not place into or through standing water, unless approved by the Engineer.
6. Properly attach or anchor all parts and materials that are to remain in the excavation to prevent objects from floating.

D. Weather Limitations

1. Unless special permission is obtained, no permanent patches shall be placed between November 1 and April 1. During these periods, a durable temporary patch shall be placed in the original access hole.
2. The maintenance of this temporary patch shall be the sole responsibility of the permittee. The permittee shall provide the Department of Engineering with the name and telephone number of the party responsible for the maintenance of the patch.

E. Permanent Patch Installation

1. If concrete is used as a patch in an area of existing asphalt pavement, the concrete shall be integral dyed with Lamp Black Dye.
2. Concrete patches will be placed 8-inches thick, or to a depth to match the existing pavement, whichever is greater.
3. Any patches placed on high volume or major arterial roads shall be a minimum of 10-inches thick, or to a depth to match the existing pavement, whichever is greater.
4. Refer to Details IV-2 and IV-3 of the Standard Drawings for additional information and requirements.

## IV-5 UNDERDRAINS

A. Pavement Underdrains are required to be installed in the following U.S.D.A. Soil Conservation Service soil classifications:

| | | | |
|---|---|---|---|
| Adrian | Del Ray | Metea | Riddles |
| Alida | Edwards | Miami | Tedrow |
| Aubbeenaubbee | Gilford | Milford | Tracy |
| Blount | Houghton | Morley | Troxel |
| Brady | Landes | Palms | WallKill |
| Brookstons | Martinsville | Quinn | Washtewaw |
| Crosier | Maumee | Rensselaer | Whitaker |

B. Pavement Underdrains shall be constructed per Detail IV-6 of the Standard Drawings.

C. Perforated Underdrain pipe shall be corrugated polyethylene drainage tubing in accordance with AASHTO M 252 or polyvinyl chloride pipe in accordance with AASHTO M 304.

D. Geotextile separator shall be a non-woven geotextile: Carthage Mills 30% or approved equal.

# SECTION V – SANITARY SEWERS

## V-1 SANITARY SEWER GRAVITY PIPE MATERIALS

A. Sanitary Sewer (Non-Pressure Gravity Sewer) shall be one of the following:

1. PVC (Polyvinyl Chloride) Pipe - ASTM D3034 for SDR 35 and SDR 26 for 15-inch diameter and smaller pipe. ASTM F679, with minimum Pipe Stiffness (PS) 46 psi and 115 psi for pipe larger than 15 inches in diameter. Joints and fittings shall conform to ASTM D3212 or ASTM D2464. Gaskets shall be reinforced with a steel ring and conform to ASTM F477.
2. Corrugated Polypropylene (PP) Pipe - Double and Triple Wall Pipe meeting ASTM F2764 for 12-inch thru 60-inch diameter. Joints and fittings shall conform to ASTM F2764 and ASTM F3212. Gaskets shall conform to ASTM F477.
3. FRP (Fiberglass Reinforced Polymer) Pipe – Pipe and fittings shall be per ASTM 3262. Joints shall be per ASTM D4161. Gaskets shall be per ASTM F477.
4. Closed Profile PVC Pipe – Pipe and fittings shall be per ASTM F1803 with a minimum Pipe Stiffness (PS) of 46 psi. Joints shall be per ASTM D3212. Gaskets shall be per ASTM F477.

B. Sanitary Sewer Gravity Pipe shall meet the following:

SANITARY SEWER GRAVITY PIPE

| Pipe Material | Designation/Type | Pipe Sizes (Diameter, in.) | | Max. Bury Depth, (ft.) | Bedding |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| PVC | ASTM D3034 / SDR 35 | 6 | 15 | 15 | Bedding Detail B |
| | ASTM D3034 / SDR 26 | 6 | 15 | 25 | |
| | ASTM F679 / PS 46 | 18 | 48 | 15 | |
| | ASTM F679 / PS 115 | 18 | 48 | 25 | |
| Corrugated Polypropylene (PP) | ASTM F2764 | 12 | 60 | 25 | Bedding Detail B |
| FRP | ASTM D3262 | 18 | 60 | 30 | Bedding Detail B |
| Closed Profile PVC | ASTM F1803 | 21 | 54 | 25 | Bedding Detail B |

## V-2 SANITARY SEWER GRAVITY PIPE INSTALLATION

A. All sanitary sewers shall be designed and installed in accordance with the "Recommended Standards for Wastewater Facilities" by the Great Lakes Upper Mississippi River Board of State and Provincial Health and Environmental Managers.

B. All sanitary sewers shall be designed and installed to provide a minimum velocity of not less than 2.0 ft/sec and a maximum allowable velocity of 15 ft/sec.

C. Sanitary sewer pipe shall be installed with the bedding as designated and per the Sanitary Sewer Pipe Bedding Detail 'A' or 'B' located in the Standard Drawings.

D. The minimum allowable sanitary sewer pipe diameter shall be 8-inch. Building sanitary sewer lateral pipes shall be a minimum diameter of 6-inches.

E. All sanitary sewer extensions shall be approved by the Indiana Department of Environmental Management (IDEM) and the City of Mishawaka Department of Engineering.

F. All sewer pipes shall be laid using a laser beam method to control alignment. All sewer pipes shall be laid true to both horizontal and vertical alignment and will be subject to review by the Department of Engineering. Pipes that do not "Lamp" shall be removed and reinstalled to true line and grade.

G. Commence laying gravity sewer pipe at the lowest point on a section of line and lay pipe with the bell ends uphill.

H. New pipe must match the pipe to which it is being connected. All of the pipes herein permitted shall be connected to a concrete manhole.

I. All sanitary sewers shall have a uniform slope between manholes or other junction structures.

J. All sanitary sewers shall be installed with a straight alignment between manholes.

K. Sanitary sewer pipe connections to manholes shall be a watertight seal made with a boot connection to prevent infiltration.

L. Prior to making connections at pipe joints and manholes, remove all mud, sand, or other foreign material then clean and dry all surfaces of pipe joints and joining material. Use materials as recommended by the manufacturer.

M. Follow the IDEM standards for separation of sanitary sewer and water distribution systems. If the minimum separation cannot be met then the sanitary sewer pipe material shall be an AWWA approved pressure grade water pipe, PVC-C900 or PVC-C905 with compression seals. The pipe shall be pressure tested in place at 150 psi without leakage.

N. A permanent video inspection, of any sanitary sewer constructed in the City or connected to the City's sewer system, shall be conducted by the City of Mishawaka's Sewer Maintenance Department. All video recording shall be completed by the City upon the submittal and approval of the as-built record drawings. Contractor shall coordinate and be responsible for all costs associated with the video inspection completed by the City.

O. The Contractor shall keep record drawings of all sewer installation per Section I-3 As-Built Record Drawings of these Standards.

P. The Contractor, upon completion of installation of the sewer, shall give written notification to the Department of Engineering.

Q. The Department of Engineering shall be notified at least 48 hours in advance of any testing, in order to be able to witness the tests. Tests for sanitary sewers shall include but not be limited to infiltration, exfiltration, deflection, and manhole vacuum.

R. Sanitary sewer service laterals shall be installed per Section V-11 of these specifications.

S. Installation of all PVC sanitary sewer pipe shall conform to ASTM D2321.

T. Underground detectable warning tape shall be placed above the sanitary sewer approximately 2 feet below finished grade. Tape to be 2-inch wide metallic lined with the wording "CAUTION SEWER LINE BURIED BELOW" continuously printed.

U. The installation of sanitary sewer pipe, within a casing, by jack/bore method shall be per Section VII-2.

## V-3 SANITARY SEWER GRAVITY PIPE TESTING

A. The Contractor may perform either an exfiltration test with water or a low-pressure air test.

B. Maximum allowable infiltration/exfiltration rate is 100 gallons per inch diameter per mile of sewer per day. Manholes, if tested separately, shall have a maximum allowable infiltration/exfiltration rate of 0.1 gallons per hour per foot of diameter per foot of head.

C. All sanitary sewer piping that is subject to a low-pressure air test shall be as follows: Plastic piping shall be tested in accordance with ASTM F1417-92. The test shall be witnessed and certified by a Professional Engineer licensed in the State of Indiana and submitted to the Department of Engineering.

D. When the normal water table is above the sewer throughout the section under test, the Contractor may, with approval from the Engineer, use the infiltration test procedure.

E. All flexible sewer piping shall be subject to deflection testing (mandrel test). The maximum acceptable pipe deflection after installation is 5 percent of the nominal pipe diameter. The pipe shall be tested by the contractor 30 days or greater after the installation is complete and prior to permanent pavement placement. The deflection test shall be completed with a 9-point mandrel for maximum deflection. The mandrel shall be pulled manually, and no force pull on the mandrel will be permitted. The deflection test shall be witnessed and certified by a Professional Engineer and submitted to the Department of Engineering. The Contractor shall provide the Engineer with a proving ring to verify the mandrel size. If the pipe fails the deflection test, the pipe shall be excavated, removed, and discarded. New pipe shall be installed and retested per the above.

F. All non-rigid sewers to be stiffness certified. The pipe stiffness shall be a minimum of 46 psi.

G. The Department of Engineering shall be notified 48 hours in advance of any testing in order to have the option of witnessing the test. If witnessed by the City or their representative, they shall sign the testing documents the day of the test.

H. All sanitary sewers shall be televised and inspected upon the completion of the installation. The Contractor will be responsible to obtain the services of the City of Mishawaka to complete the televised inspection.

I. All required Testing Forms can be obtained from the City of Mishawaka Department of Engineering upon request.

## V-4 SANITARY SEWER MANHOLES

A. Manholes shall be constructed per the Standard Drawings for the type and size shown on the drawings.

B. Manhole frame and lids shall be a 24-inch frame and lid type only for sanitary sewers that are both 27-inch in diameter and smaller and with bury depths of 10 feet or less. All other manhole fame and lids shall be the 36-inch frame and lid type.

C. The 36-inch manhole frame and lid shall be a Neenah R-1741-D or approved equal per Detail V-7 of the Standard Drawings. The manhole lid shall have a 36-inch opening with a 24-inch interior offset opening. The 24-inch offset opening shall be placed over the manhole steps.

D. The 24-inch manhole casting shall be a Neenah R-1642 or approved equal per Detail V-7 of the Standard Drawings.

E. Concrete spacer rings used to adjust the manhole frame and lid shall meet the following requirements:
   1. No more than 12” of total height of spacer rings.
   2. No more than four (4) spacer rings total
   3. 1” spacer rings shall be approved by Engineer and limited to only one (1) per manhole.
   4. Spacer rings shall be concrete. Alternate materials shall be approved by Engineer.

F. Manholes shall be constructed per ASTM C478 with joints meeting requirements of ASTM C443.

G. New manholes shall have exposed interior wall and joint sections coated with a corrosion protection system, if designated by the City. The corrosion protection lining shall be installed to a minimum thickness of 125 mils to create a monolithic (void free) liner. The corrosion protection system for new manholes shall be the following:
   1. High-build polyurethane coating system with a minimum film thickness of 125 mils. Polyurethane coating manufacturers are Spray Wall as manufactured by Sprayroq, Inc. or approved equal.
   2. Application of the coating system shall be per the recommendations of the coating manufacturer including material handling, mixing, environmental controls, application, safety, and spray equipment. The corrosion protection system shall be applied by a Certified Applicator of the protective coating manufacturer and according to manufacturer specifications.
   3. All corrosion protection systems installed shall be tested per the manufacturer’s recommendations, including but not limited to holiday detection testing per NACE RPO 188-99 and adhesion testing.

## V-5 SANITARY MANHOLE VACUUM TESTING

A. The Sanitary Manhole Vacuum Test shall be performed per ASTM C 1244 on all Type A and Type B sanitary manholes.

B. Contractor shall furnish, install, and operate all equipment, and materials, including meters, gauges, fuel, bulkheads, water and accessory equipment and all manpower for the test.

C. The test shall be witnessed and certified by a Professional Engineer and submitted to the Department of Engineering.

D. If the test fails, the Contractor shall determine the cause, and then repair/replace the manhole to the satisfaction of the Engineer. The test shall be repeated until it is successful.

E. The Department of Engineering shall be notified 48 hours in advance of any testing in order to have the option of witnessing the test. If witnessed by the City or their representative, they shall sign the testing documents the day of the test.

F. The required Sanitary Manhole Vacuum Test Form can be obtained from the City of Mishawaka Department of Engineering upon request.

## V-6 SANITARY LIFT STATION

A. The requirements for a sanitary lift station shall not be limited to the following specifications. Contact the Department of Engineering and the Mishawaka Utilities Wastewater Division for more detailed specifications and requirements for a sanitary lift station.

B. Description:
   1. Lift Stations shall be a factory-built dry pit-wet well type sewage lift station complete with precast concrete wet well and all power and other services.
   2. A security fence and access road shall be provided on the site location of the lift station.
   3. An exterior electrical panel with a permanent emergency generator with automatic transfer switch shall be provided.

C. Submittals:
   1. The lift station shall not be released for fabrication until reviewed shop drawings and design calculations have been approved and released by the Department of Engineering and the Mishawaka Utilities Wastewater Division.
   2. Design calculations for the lift stations shall be certified by a registered Professional Engineer.

D. Products and Installation:
   1. The Contractor shall furnish and install one factory-built automatic pumping station. The station shall be complete with all needed equipment factory-installed in a welded steel chamber with welded steel entrance tube and with maintenance lift to provide access.

2. The principal item of equipment shall include two vertical, close coupled, motor driven, non-clog sewage pumps; valves; internal piping; central control panel with circuit breakers; motors starters; automatic pumping level controls; lighting; sump pump; ventilator; dehumidifier and all internal wiring.
3. The Contractor shall furnish and install a pump control panel mounted within a NEMA Type 1 enclosure, fabricated of steel and reinforced as required. All circuit breakers, motor-starters, reset buttons and pump control switches shall be mounted so that they are operable without opening the high voltage cabinet.
4. The Contractor shall furnish and install a level transducer to control pump operation by the level of the sewage in the wet well. The transducer shall be suspended by a stainless-steel cable or a pipe mounted within the wet well. The transducer shall produce a 4-20 mA signal that will feed into the pump controller.
5. The Contractor shall furnish and install a secondary level control system.
6. The Contractor shall furnish and install a pump controller.
7. The Contractor shall coordinate the necessary interface contacts between the pump control panel and the telemetry panel with the manufacturers.
8. The Contractor shall provide the lift station with communication system that works with the existing system used by the Mishawaka Utilities Wastewater Division.
9. The Contractor will be responsible for the following:
    a. Modifications to the master computer software to accept the new lift station controls.
    b. Establishing stable communication from the lift station to the WWTP master telemetry computer.
    c. The Contractor shall coordinate the above with Mishawaka Utilities Wastewater Division.
10. Substitution of equipment other than that stated will not be accepted without prior approval from the Department of Engineering.

## V-7 SANITARY SEWER FORCEMAIN MATERIALS

A. Sanitary Sewer Forcemains (Pressure Sewers) shall be one of the following:
1. PVC (Polyvinyl Chloride) Pipe –Shall conform to AWWA C900/C905. Joints shall be restrained bell and spigot as needed. Fittings shall be restrained ductile iron fittings conforming to AWWA C110/C111. Gaskets shall be per ASTM F477 and ASTM D3139. Minimum wall thickness shall be a DR 18.
2. High Density Polyethylene (HDPE) Pipe - Shall conform to ASTM D3350 with a minimum cell classification of PE345464C. The pipe shall have a nominal Ductile Iron Pipe OD with a minimum wall thickness no less than DR 11. Fittings shall be per ASTM D 3261. The pipe thickness required shall be determined based on the installation methods and the live and dead loads. The use of HDPE forcemain pipe shall be upon approval only.

## V-8 SANITARY SEWER FORCEMAIN INSTALLATION

A. All sanitary sewers shall be designed and installed in accordance with the "Recommended Standards for Wastewater Facilities" by the Great Lakes Upper Mississippi River Board of State and Provincial Health and Environmental Managers.

B. All sanitary sewer forcemains shall be approved by IDEM and the Department of Engineering.

C. Prior to making connections at pipe joints and manholes, clean and dry all surfaces of pipe joints and joining material. Use materials as recommended by the manufacturer.

D. Concrete thrust blocking and restrained joints shall be provided at all changes in directions. Concrete thrust blocking anchors shall bear against undisturbed earth. Restrained joints shall be used in combination with concrete thrust blocking. Restrained joints shall be placed at fittings upstream and downstream of the fitting to be anchored.

E. Follow the IDEM standards for separation of sanitary sewer and water distribution systems.

F. Sanitary sewer force main pipe, being installed by open cut method, shall have the required pipe bedding for flexible pipe, as referenced in the Sanitary Sewer Pipe Bedding Detail "B", in the Standard Drawings.

G. Sanitary sewer force main pipe shall be installed with a minimum of five (5) feet of cover and a maximum of nine (9) feet of cover. Any sanitary force mains proposed for installation deeper than nine (9) feet shall be approved by the Department of Engineering.

H. The Contractor, upon completion of installation of the sewer, shall give written notification to the Department of Engineering.

I. The Department of Engineering shall be notified at least 48 hours in advance of any testing, in order to be able to witness the tests.

J. The locations of buried sanitary sewer forcemains shall be identified with either above ground or at grade pipe markers located at a minimum of 400 feet intervals and at all changes in horizontal alignment. Underground detectable tracer wire, Type TW insulated #12, shall be placed above the forcemain and connected to a terminal located within each marker. The tracer wire shall maintain connectivity throughout the length of the forcemain, including at any changes in direction, structures, air release valves, manholes, pipe markers, etc. The markers shall be per Details V-15, V-15A and V-15B in the Standard Drawings.

K. The installation of sanitary sewer forcemains, within a casing, by jack/bore method shall be per Section VII-2.

## V-9 SANITARY SEWER FORCEMAIN TESTING

A. Leakage and Pressure Tests shall be witnessed and certified by a Professional Engineer and submitted to the Department of Engineering. Contractor shall notify the City and the Engineer within 48 hours of testing to allow test to be witnessed.

B. The Contractor shall be responsible for providing all equipment and tools necessary to perform pressure tests and leakage tests. Tests shall be per the following:

1. Supply water, install, and operate the pumps, calibrate gauges and meters, and supply all necessary manpower and apparatus for the test.
2. Hydrostatic Pressure Test: After the line has been backfilled and at least 7 days after the last concrete anchor block was poured (if applicable), hydrostatic pressure test shall be performed. Carefully fill the system with water at a velocity of approximately 1 foot per second while necessary measures are taken to eliminate all air. After the system has been filled, raise the pressure by pump to test the greater of 1.5 times the working pressure or 90 psi. Measure pressure at lowest point in system with gauge compensated for elevation. Maintain this pressure for at least 2 hours. If pressure cannot be maintained, determine the cause, repair, and repeat the test until successful. The method of repair shall be approved by the Engineer.
3. The leakage test shall be conducted concurrently with the pressure test. Leakage shall be determined with a calibrated test meter furnished by the Contractor. Leakage is defined as the quantity of water required to maintain a pressure within 5 psi of the specified test pressure, after air has been expelled and the pipe filled with water.
4. Leakage shall not exceed 10 gallons per day per mile per inch of diameter specified. If leakage exceeds the specified limits, the Contractor shall find and repair the leaks and repeat the test until successful.
5. All visible leaks shall be repaired regardless of amount of leakage.

## V-10 AIR RELEASE VALVES

A. Air Release Valves shall be A.R.I. Flow Control Accessories Ltd. Model D-023 Combination Air Valve or equivalent approved by the Department of Engineering.

B Air Release Valves shall be installed upon the Department of Engineering's approval only. Air Release Valves shall be installed at each significant high point where air could become trapped. The air release valve shall be installed in a manhole structure with provisions made for draining the structure, odor control and for an exhaust pipe. Force mains shall be designed to minimize the number of air release valves.

## V-11 SANITARY SEWER LATERALS

A. The sanitary sewer service lateral shall connect to the public sewer mainline per the Standard Drawings.

B. Building sanitary sewer laterals shall be installed with a minimum of five (5) feet of cover.

C. Contractor shall obtain all necessary permits needed for work within the Right-of-Way or sanitary sewer easement. Service connections to mainline sewers shall require a permit and tapping fees per the City requirements.

D. There should be only one building sanitary sewer service lateral connection per parcel. If any commercial or industrial parcels have more than one building to connect, a sewer main extension is required and shall be approved by the Department of Engineering.

E. Inside drop connections to manholes will not be permitted.

F. Sanitary sewer service risers installed for future connections shall be terminated at the street right-of-way or easement and shall be properly plugged to ensure a watertight seal.

G. The minimum allowable inside diameter for all sanitary sewer pipe laterals shall be 6-inch with a slope no less than obtaining 2 ft/sec velocity (1%).

H. Clean-outs, equal in size to the sanitary sewer lateral shall be required at the following locations:

1. The outside junction of all residential and commercial sanitary sewer laterals shall be within three (3) feet of the building foundation,
2. Every 100 linear foot of sanitary sewer lateral piping.
3. Any Change of direction greater than 45 degrees. Where more than one change of direction occurs in a run of piping, one cleanout shall be required for each change of direction that results in a total deflection of 90 degrees.

I. All 6-inch sanitary sewer service lateral connections to existing sanitary sewers, with an existing tap, shall be installed and connected to the existing tap with a shielded Fernco coupling, or approved equal per Detail V-11 in the Standard Drawings.

J. All 6-inch service lateral connections to existing sanitary sewers, without an existing tap, shall be installed with a saddle wye fitting to the existing main sanitary sewer pipe. Stainless steel reinforcing bars and straps shall be used for connection of the saddle wye to existing sewer. Refer to Detail V-11 in the Standard Drawings.

K. A shielded Fernco Coupling or approved equal shall be used for connection of two different sanitary sewer lateral pipe materials. Refer to Details V-10 and V-11 in the Standard Drawings.

L. Any service connection servicing more than one building shall be a minimum of 8-inches inside diameter.

M. Manholes shall be used for all 8-inch or larger sanitary sewer service lateral connections and at any change in direction.

N. All sanitary sewer service lateral piping and fittings shall be PVC SDR 35, per ASTM D-3034, with gasketed joints, per ASTM D-3212, unless otherwise indicated. Installation of all PVC sanitary pipes shall conform to ASTM D-2321.

O. Sanitary Sewer service lateral testing:
   1. Building sewer test: The building sewer shall be tested by insertion of a test plug at the point of connection with the public sewer or individual sewage disposal system. The building sewer shall then be filled with water under a head of not less than 10 feet. The water level at the top of the test head of water shall not drop for at least 15 minutes.
   2. Air Test: The air test shall be made by attaching an air compressor testing apparatus to an opening, and after closing all other inlets and outlets to the system, forcing air into the system until there is a gauge pressure of 5 pounds per square inch. This pressure shall be held without introduction of additional air for a minimum period of 15 minutes.
   3. Sewer Tap Inspection: Call the Mishawaka Sewer Department at least 24 hours before inspection is needed.

P. A privately maintained sanitary sewer system that may include, but is not limited, to the following: sewer main, manholes, lift stations, force mains, multiple service laterals and connects downstream to the City of Mishawaka's sewer collection system shall require the following:
   1. Meet all pipe material requirements as stated in Section V-1 of these specifications.
   2. Meet all installation and testing requirements as stated in Section V-2 and V-3 of these specifications.
   3. Sanitary manholes shall be installed and tested per sections V-4 and V-5 of these specifications.
   4. All design plans shall be signed by a Professional Engineer licensed in the state of Indiana and submitted for approval to the City of Mishawaka Department of Engineering.

Q. Modifications or changes to the above shall be approved by the Department of Engineering.

## V-12 GREASE INTERCEPTORS

A. Grease Interceptors shall be required for the following types of new building developments, existing buildings with new kitchen additions, existing buildings undergoing a change in ownership/occupancy or any existing building/facility experiencing difficulty achieving compliance with the maintenance and/or wastewater discharge limitations:
   1. All non-residential developments involved in food preparation, processing, and service of food or food products.
   2. A Multi-family residential development that will, or has the potential to, discharge grease, oil, or similar substances, having a quantity and characteristics above that of a normal family residential waste, to the sanitary sewer.
   3. Any development or building that will, or has the potential to, discharge grease, oil, or similar substances, having a quantity and characteristics above that of a normal family residence waste, to the sanitary sewer.

B. Construction and Installation

1. Installation of all grease interceptors shall be downstream of all kitchen drains or grease-laden equipment drains and dishwashers and in a location readily and easily accessible for cleaning, maintenance, and inspection purposes.
2. Grease interceptors shall be constructed with a minimum of one baffle pipe on both the inlet and outlet sides.
3. Grease interceptors are to be installed at a minimum distance of 10 feet from sinks and 20 feet from dishwashers to allow for adequate cooling of the wastewater. Water temperatures must be less than 120 degrees Fahrenheit prior to entering the grease interceptor.
4. Each building or facility shall have a separate individual exterior grease interceptor.
5. If directed to by the Department of Engineering, a sample port or manhole shall be installed downstream of the grease interceptor. The opening shall be a minimum of 24-inches to allow for sampling access. Refer to Detail V-16 in the Standard Drawings.
6. All grease interceptors shall have the following:
   a. Minimum inlet pipe diameter of 4-inches.
   b. A one-way clean-out before the grease interceptor and a two-way clean-out on the outlet side of every grease interceptor.
   c. Manhole(s) at each internal baffle pipe.
   d. A minimum of 9-inches shall be maintained from the liquid level to the grease interceptor top.
   e. Interior baffle pipe tees shall extend a minimum of 0.15 of the liquid depth above the liquid level.
   f. Inlet baffle pipe tee shall extend 0.25 of the liquid depth below the liquid level.
   g. Outlet baffle pipe tee shall extend 0.5 of the liquid depth below the liquid level.
   h. Manhole access covers over each baffle pipe shall be a minimum 24-inches in diameter. Castings shall be cast iron or equivalent traffic bearing material. All grade rings shall be grouted/sealed. Manholes/covers shall extend to the finished grade and shall be water and gas tight.
   i. Concrete grease interceptors shall have a minimum concrete compressive strength of 3,500 psi. Grease interceptor and castings shall be structurally designed for vehicular traffic with an H-20 Highway load.
7. Grease interceptors shall be per Details V-16 and V-17 in the Standard Drawings.
8. All connections to grease interceptors shall be inspected and approved by the City prior to backfill. The City will require 72hours notice prior to inspection.

C. Grease Interceptor Size Requirements

1. Grease interceptors shall be sized based on the following calculations:

| Grease Interceptor Sizing Calculations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tank Size (in gallons) | = | Meals Served During Peak Hour | X | Waste Flow Rate Factor | X | Retention Time Factor | X | Storage Factor |

| | | |
|---|---|---|
| Meals Served During Peak Hour | | |
| Meals Served During Peak Hour = Seating Capacity x Peak Factor | | |
| a. | Peak Factor for Fast Food Restaurants | 1.33 |
| b. | Peak Factor for all other Food Service Types | 1 |
| Waste Flow Rate Factor | | |
| a. | Commercial Kitchen with dishwashing machine | 6 |
| b. | Commercial Kitchen without dishwashing machine | 5 |
| c. | Single Service Kitchen | 2 |
| d. | Sink waste only | 1 |
| Retention Time | | |
| a. | Commercial Kitchen waste | 2.4 |
| b. | Single Service Kitchen | 1.5 |
| Storage Factor | | |
| a. | Fully equipped Commercial Kitchen having | |
| | 8-hour operation | 1 |
| | 12-hour operation | 1.5 |
| | 16-hour operation | 2 |
| | 24-hour operation | 3 |
| b. | Single Service Kitchen | 1.5 |

2. The sizing method described above is intended as guidance in determining the grease interceptor size. It is the responsibility of the property owner and/or contractor to ensure that the appropriate size interceptor is installed to meet the level of treatment needed.
3. A Commercial Kitchen shall be a food service establishment that is a full service or take-out restaurant, catering kitchen, employee cafeteria, fast food restaurant, drive-thru restaurant, or any facility engaged in preparing and heat processing food which uses any equipment such as the following: compensating hoods, grease filters, kitchen hoods, three-compartment sinks, or any other similar types of equipment.
4. A Single Service Kitchen shall be any food establishment that does no food preparation, baking or cooking, i.e., concession stands. They only heat, assemble and serve foods using paper service items.
5. A Fast Food Restaurant shall be any restaurant that quickly dispenses food and provides take out/carry services and/or a drive-thru service.
6. Refer to the Grease Interceptor Detail V-17 in the Standard Drawings.
7. Regardless of the sizing formula, the minimum size grease interceptor shall be no less than 750 gallons total capacity unless otherwise approved by the City.

8. The maximum size of grease interceptors allowed shall be a 3000-gallon capacity tank. If a larger capacity grease interceptor is required, then multiple grease interceptors shall be installed in a series. Grease interceptors that are installed in series shall be of similar size and have a two-way clean-out between structures.
9. Polyethylene or fiberglass grease interceptors may be allowed, in lieu of an exterior concrete grease interceptor if approved by the City of Mishawaka. Approval shall be based on a request, submitted to the City, that includes calculations, data, drawings, a detailed maintenance plan, designated maintenance supplier and any other information to support the installation and maintenance of the proposed grease interceptor. All polyethylene or fiberglass grease interceptors shall be traffic rated.

D. Alternative Methods

1. An exterior concrete grease interceptor, per the size requirements above, is the primary required device unless site or property restrictions or certain circumstances require an alternative procedure. Any establishment that proposes the use of an alternative method for grease containment must submit a request to the City. The submitted proposal request shall include calculations, data, drawings, a detailed maintenance plan, designated maintenance supplier and any other information to support the installation and maintenance of the proposed alternative. A Professional Engineer licensed in the State of Indiana shall design and sign the proposal.
2. The use of an alternative method will only be approved by the City based on the following conditions:
    a. In the circumstance of a “Single Service Kitchen” with no food preparation, baking or cooking (heat/serve only) and the meals are served on disposable plates and utensils, i.e., concessions stands.
    b. For cases in which exterior type grease interceptors are infeasible to install due to physical property restrictions, including zero-lot line, i.e., downtown areas with existing building structures located at sidewalk or roadway. The alternative, due to physical property restrictions, cannot be used with the construction of a new building where the owner or contractor did not provide a stub and the necessary room for the installation of the appropriate sized exterior grease interceptor.
3. A mechanical grease trap alternative that has previously received approval in the cases noted above may be submitted for approval and shall meet the following:
    a. Mechanical Grease Trap - The Big Dipper Series or an approved equal with a minimum 50 gallon per minute (gpm) flow rated or a 100 pound grease retention mechanical grease trap may be used.
    b. The grease trap shall be installed in a separate area from the food handling area and in a location that is easily accessible for cleaning, maintenance, and inspection.

c. The grease trap shall be downstream of all kitchen drains or grease-laden equipment drains. The maintenance and inspection procedures for a mechanical grease trap shall be the same as that required of a grease interceptor.

E. Maintenance and Inspection

1. All property owners or utility users with grease interceptors or grease traps shall have sole responsibility for the maintenance of the grease interceptor or grease trap. They shall be responsible for the proper removal and lawful disposal, by appropriate means, of the captured material in the interceptors.
2. All property owners or utility users with grease interceptors or grease traps shall maintain a written record on site of grease interceptor or grease trap maintenance.
3. Maintenance shall include the complete removal of all contents, including floatable materials, wastewater, sludge, and solids.
4. General rule for the maintenance of grease interceptors requires that they shall be cleaned out when the grease and solids level has reached a maximum of 25% of the capacity.
5. No grease waste shall be discharged directly to the City's wastewater collection system.
6. The City has the right to inspect all grease interceptors and grease traps that are upstream from the City's wastewater collection system at any time. Any person, business or owner that are found to be responsible for the discharging of fats, oils and grease shall be charged for the cost of rectifying any and all issues created by the discharge.

## V-13 SANITARY SEWER REHABILITATION, CURED IN-PLACE PIPE (CIPP)

A. Existing sanitary sewers with CIPP rehabilitation, as designated by the City of Mishawaka, shall include design plans and specifications that shall be submitted for approval by the City.

1. All CIPP products, design, installation, and testing shall comply with the latest versions of ASTM D5813, ASTM F1216 and ASTM F1743.

# SECTION VI - STORM SEWERS

## VI-1 STORM WATER DRAINAGE DESIGN

A. All storm water drainage systems shall be designed using the current version of the Indiana LTAP Stormwater Drainage Manual.

B. Storm water storage systems shall be designed to retain all storm water runoff with a minimum storage capacity based on a 100-year storm frequency, 24-hour duration.

C. Storm sewers shall be designed and sized based on a minimum 10-year return period.

D. An outflow release, not to exceed a 10-year undeveloped rate using the undeveloped time of concentration, may be allowed if a legal drain is accessible to the site and all approvals are obtained from the appropriate county, state, and federal agencies.

1. Outlet pipe flow shall be designed to not exceed allowable outflow release rate.

E. Local rainfall intensities shall be obtained from the National Oceanic and Atmospheric Administration (NOAA).

F. Runoff Coefficients, C, shall be in accordance with the values listed in the Indiana LTAP Stormwater Drainage Manual.

G. Storm Water Retention or Detention Systems shall be designed with the following parameters:

1. Basins shall have a minimum 1-foot of freeboard.
2. A 6% siltation factor shall be accounted for in the basin volume.
3. Infiltration may be accounted for, with a minimum safety factor of 2.
    a) Infiltration rates shall be verified by a geotechnical investigation and certified by a licensed Professional Engineer in the State of Indiana.
    b) If infiltration is requested within a well head protection area, pre-treatment is required. (filter strip, hydrodynamic separator, etc.)
4. Basins shall have maximum 4:1 side slope, 6:1 side slope when adjacent to roadways.
5. Basins adjacent to roadways shall be located outside the clear zone as defined by the IDM and AASHTO.
6. The following basin details shall be provided:
    a) Dry or wet bottom
    b) Top of bank elevation
    c) Bottom elevation
    d) Design high water elevation
    e) Normal water elevation (if applicable)
    f) Groundwater elevation
    g) Outlet elevation (if applicable) shall be a minimum 1-foot above the pond bottom to prevent siltation in pipe.
    h) Capacity required
    i) Capacity provided
    j) Side slopes

7. The maximum permanent pool depth shall not exceed 5 feet. If the desired depth is greater than 5 feet then additional safety measures shall be installed (e.g. safety ledges, buffers, signage, screening, fencing, etc.).

H. Underground storage systems may be allowable and will be approved on a case-by-case basis.

I. Subdivision drainage shall petition for approval into the Urban Drain System through the St. Joseph County Drainage Board.

## VI-2 DEWATERING DISCHARGE

A. Any dewatering operation shall not discharge into the City's sewer system without approval from the Department of Engineering.

B. The request to the City for approval for discharging from a dewatering operation shall include the following information:
1. The duration of the proposed dewatering operation.
2. The total pump capacity or anticipated flow.
3. The location of the discharge outlet into the sewer system.
4. A Maintenance-of-Traffic Plan, if applicable.
5. Contractor emergency contact information.
6. Any other pertinent information that may be required by the City.

C. A sediment filtration process shall be included in all dewatering systems discharged into the City's sewer system. The sediment filtration shall be continually monitored to ensure that it is working properly and removing sediments from the discharge water.

D. Contractor shall be responsible for any site or structure restorations required and make provisions for site erosion and sediment controls.

## VI-3 STORM SEWER PIPE MATERIALS

The following pipe materials may be used for storm sewer installations. For storm sewer installations with the cover exceeding 10 feet, a design shall be completed and signed by a Professional Engineer licensed in the State of Indiana and shall be submitted to the Department of Engineering for review and approval.

A. Storm Sewer Pipe (Non-Pressure Gravity) shall be one of the following:
1. Reinforced Concrete Pipe (RCP) – Shall meet the requirements of ASTM C76, Class III, with Wall B for pipes less than 24" and Wall C for pipe sizes 24" and larger. Gaskets and joints shall meet the requirements of ASTM C443.
2. Ductile Iron Pipe (DIP) – Shall meet the requirements of AWWA C150 and C151 with minimum pressure classification 350 psi. Joints shall be per AWWA C111 and C151. DIP shall have a cement mortar lining per AWWA C140 and an asphaltic coating per AWWA C151.

3. Polyvinyl Chloride Pipe (PVC) – Shall meet the requirements of ASTM D3034 for 15-inch diameter and smaller pipe and per ASTM F679, with minimum Pipe Stiffness (PS) 46 psi for pipe larger than 15-inch in diameter. Fittings shall conform to ASTM D3034 and ASTM F679 and gaskets shall conform to ASTM D3212 and ASTM F477.
4. Profile Wall PVC Pipe – Shall meet the requirements of ASTM F949 with a minimum PS 46 psi. Joints and fittings shall be per ASTM F949 and ASTM F794. Gaskets shall be per ASTM F477.
5. PVC C900/C905 (Pressure Grade) Pipe – Shall meet AWWA C900 for 12-inch pipes and AWWA C905 for pipes 14-inch in diameter and larger. Joints shall be bell and spigot with restraints as required. Fittings shall be restrained ductile iron fittings conforming to AWWA C110/C111. Gaskets shall be per ASTM F477/D3139.
6. High Density Polyethylene (HDPE) Dual Wall Corrugated Pipe – Shall meet the requirements of ASTM F2306 and AASHTO M294, Type S. Joints shall be per AASHTO M252 and gaskets per ASTM F477. Fittings per ASTM F2306 and AASHTO M252.

STORM SEWER GRAVITY PIPE

| Pipe Material | Designation/Type | Pipe Sizes (Diameter, in.) | | Max. Bury Depth, (ft.) | Bedding |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| RCP | ASTM C76 | 12 | 144 | 20 | Bedding Detail A |
| DIP | AWWA C151 | 12 | 64 | 25 | Bedding Detail B |
| PVC | ASTM D3034 / SDR 35 | 6 | 15 | 15 | Bedding Detail B |
| | ASTM F679 / PS 46 | 18 | 48 | | |
| Profile Wall PVC | ASTM F949 | 12 | 36 | 25 | Bedding Detail B |
| PVC C900/C905 (Pressure Grade) | AWWA C900 | 12 | 12 | 30 | Bedding Detail B |
| | AWWA C905 | 14 | 36 | | |
| HDPE | ASTM F2306 | 12 | 36 | 25 | Bedding Detail B |
| | AASHTO M294, TYPE S | 12 | 36 | | |

## VI-4 PERFORATED STORM SEWER PIPE MATERIALS

The following perforated pipe materials shall only be used for roadway drainage systems that are design and signed by a Professional Engineer licensed in the State of Indiana and submitted and approved by the Department of Engineering. Perforated pipes will not be permitted within a wellhead protection area.

A. Perforated Storm Sewer Pipe (Non-pressure Gravity) shall be one of the following:
   1. Smooth-Lined Corrugated Polyethylene Pipe (SLCP) – Shall meet the requirements of AASHTO M294, Type S for pipe sizes 12-inch through 36-inch in diameter. Joints shall be per ASTM D3212 and gaskets per ASTM F477.
   2. High Density Polyethylene (HDPE) Dual Wall Corrugated Pipe – Shall meet the requirements of ASTM F2648 and AASHTO M252. Perforations shall be per AASHTO M252/M294 and ASTM F2648. Joints shall be per AASHTO M252/M294 and ASTM D3212. Gaskets shall meet ASTM F477. Fittings shall be per AASHTO M252/M294.
      a. HDPE pipe shall only be used with the approval of the Department of Engineering.
   3. Profile Wall PVC Pipe - Shall meet the requirements of AASHTO M304 and ASTM F794 with gaskets conforming to ASTM D3212 and F477.

PERFORATED STORM SEWER GRAVITY PIPE

| Pipe Material | Designation/Type | Pipe Sizes (Diameter, in.) | | Max. Bury Depth, (ft.) | Bedding |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| SLCP | AASHTO M294 | 12 | 36 | 20 | Bedding Detail B |
| HDPE | ASTM F2648 | 12 | 36 | 20 | Bedding Detail B |
| | AASHTO M252 | | | | |
| Profile Wall PVC | AASHTO M304 | 12 | 36 | 20 | Bedding Detail B |
| | ASTM F794 | | | | |

B. Perforated storm sewer pipe and the surrounding aggregate shall be encased in a non-woven geotextile, Carthage Mills 30% or approved equal.

## VI-5 STORM SEWER PIPE INSTALLATION

A. All storm sewer pipes shall be laid using a laser beam method to control alignment. All sewer pipes shall be laid true to both horizontal and vertical alignment and will be subject to review by the Department of Engineering. Pipes that do not “Lamp” shall be removed and reinstalled to true line and grade.
B. The Department of Engineering shall be notified upon completion of all storm sewer pipe installation for a visual inspection.
C. All storm sewer pipes and structures installed shall be documented and recorded per the requirements of Section I-3 As-Built Record Drawings of these Standard Specifications.
D. Commence laying gravity sewer pipe at the lowest point on a section of line and lay pipe with the bell ends uphill.
E. Storm sewer inlets shall be placed upstream of curb ramps, whenever possible.
F. New pipe must match the pipe to which it is being connected. All of the pipes herein permitted shall be connected to a concrete manhole.

G. All sanitary sewers shall have a uniform slope between manholes or other junction structures.

H. All sanitary sewers shall be installed with a straight alignment between manholes

I. Prior to making connections at pipe joints and manholes, remove all mud, sand, or other foreign material then clean and dry all surfaces of pipe joints and joining material. Use materials as recommended by the manufacturer.

J. Follow the IDEM standards for separation of storm sewer and water distribution systems. A minimum of 18-inches of separation shall be maintained between any sewer pipe and water main utility crossings. If the minimum separation cannot be met, then the storm sewer pipe material shall be a pressure grade pipe of ductile iron with mechanical joints or PVC-C900 or PVC-C905 with compression seals. The pipe shall be pressure tested in place at 150 psi without leakage. Notice shall be given to the Department of Engineering and inspection of tests may be required.

K. The installation of storm sewer pipe, within a casing, by jack/bore method shall be per Section VII-2.

## VI-6 STORM SEWER PIPE TESTING

A. Deflection Test - A vertical deflection test (Mandrel Test) shall be completed on all flexible storm sewer pipe. The maximum acceptable pipe deflection after installation is 5 percent of the nominal pipe diameter. The pipe shall be tested by the contractor 30 days or greater after the installation is complete and prior to permanent pavement placement. The deflection test shall be completed with a 9-point mandrel for maximum deflection. The mandrel shall be pulled manually, and no force pull on the mandrel will be permitted. The deflection test shall be witnessed and certified by a Professional Engineer and submitted to the Department of Engineering. The Contractor shall provide the Engineer with a proving ring to verify the mandrel size. If the pipe fails the deflection test, the pipe shall be excavated, removed, and discarded. New pipe shall be installed and retested per the above.

B. The Department of Engineering shall be notified 48 hours in advance of any testing in order to have the option of witnessing the test. If witnessed by the City or their representative, they shall sign the testing documents the day of the test.

## VI-7 STORM SEWER STRUCTURES AND CASTINGS

A. Storm sewer structures shall be constructed per the Standard Drawings for the type and size shown on the drawings.

B. Manholes, inlets, and other storm structures shall be precast concrete constructed per ASTM C478 with joints meeting requirements of ASTM C443

C. Storm sewer structure castings shall be as specified in the Mishawaka Standard Drawings or as approved by the Department of Engineering.

D. All storm sewer catch basin and inlet castings shall be NPDES Phase II compliant with a permanently cast fish image and “DUMP NO WASTE! DRAINS TO WATERWAYS!” message.

E. Storm manhole frames and solid lids shall be a Neenah R-1642 or approved equal. Open grate castings shall be a Neenah R-2501. Inlet castings shall be as noted in the Inlet Detail VI-7 in the Standard Drawings or approved equal.

F. All old castings that are removed or replaced during construction shall be turned over to the City.

G. Concrete spacer rings used to adjust the manhole castings shall meet the following requirements:
   1. No more than 12” of total height of spacer rings.
   2. No more than four (4) spacer rings total
   3. 1” spacer rings shall be approved by Engineer and limited to only one (1) per manhole.
   4. Spacer rings shall be concrete. Alternate materials shall be approved by Engineer.

H. If the minimum separation required between storm sewer structures and water lines cannot be met, then storm sewer structures shall be lined with an exterior bituminous waterproof coating.

# SECTION VII - OTHER UTILITIES

## VII-1 WATER UTILITIES

A. Water utilities shall be installed and tested per the "General Construction Specifications" for the Mishawaka Utilities Water Division.

## VII-2 UTILITIES IN CASING (JACK/BORE METHODS)

A. Materials
   1. Carrier pipes used in the crossings shall be the same material as that adjacent to the crossings. The carrier pipe shall be installed per the lines and grades shown on the plans or as directed.
   2. The Casing pipe shall be as shown on the plans. Steel casing shall have a minimum thickness as shown in the Pipe in Casing Detail, VII-1, in the Standard Drawings.
   3. All utilities installed under a railroad right-of-way shall be in accordance with the specifications and requirements of the railroad having jurisdiction.
   4. All utilities installed under or within a federal or state roadway or highway shall be in accordance with the specifications and requirements of the respective entity having jurisdiction.

B. Installation
   1. The casing pipe shall be so constructed as to prevent leakage of any substance from the casing throughout its length except at the ends of the casing, which must be blocked to prevent the entrance of foreign material. Casing shall be installed to prevent the formation of a waterway under the Pipe, and with an even bearing throughout its length, and shall slope to one end as shown on the plans.
   2. The casing pipe shall be pushed into the embankment with jacks and shall have a boring auger rotating within the pipe to remove the spoil. The front of the pipe shall be provided with mechanical arrangements or devices that will prevent the auger and cutting head from leading the pipe by more than ½ -inch. Under no circumstances will more than ½ -inch of unsupported excavation be permitted ahead of the casing pipe. The face of the cutting head shall be arranged to provide reasonable obstruction to the free flow of soft or poor material into the casing.
   3. The use of water or other liquids to facilitate casing emplacement and spoil removal is prohibited.
   4. If an obstruction is encountered during installation to stop the forward action of the pipe, and it is evident that it is impossible to advance the pipe, operations will cease and the casing shall be abandoned in place and completely filled with grout per INDOT Specifications.

5. All installations shall have a bored hole essentially the same as the outside diameter of the pipe, plus the thickness of the protective coating. If voids should develop or if the bored hole is greater than the outside diameter of the casing by more than 1-inch, grouting shall be required to fill the voids.
6. When a gravity flow carrier pipe is placed inside the casing pipe, the carrier pipe shall be secured to the lines, slopes, and grades shown on the plans and then the void between the 2 pipes shall be filled with a flowable grout, unless otherwise indicated on the plans, so that the carrier pipe remains in a fixed position.

## VII-3 BEDDING DETAILS FOR UTILITIES

A. Utilities shall adhere to the Pipe Bedding Detail ‘A’ or ‘B’ located in the Standard Drawings.

# SECTION VIII - TRAFFIC

## VIII-1 STREET SIGNS

A. The developer is responsible for payment to the City of Mishawaka prior to the installation of all traffic control signing and street name signs on all streets to be dedicated to the City. All street signs and traffic control devices are to be in accordance with the IMUTCD.

## VIII-2 PAVEMENT MARKINGS

A. Pavement markings on asphalt pavement within the city right-of-way shall be thermoplastic material.
B. Pavement markings on concrete pavement within the city right-of-way shall be multi component (epoxy) material.
C. All longitudinal pavement markings on asphalt pavement (center lines, lane lines, edge lines) shall be grooved, per INDOT Standard Specifications.
D. All pavement markings are to be in accordance with the IMUTCD.

## VIII-3 MAINTENANCE OF TRAFFIC

A. Any work that is performed within the city right-of-way that requires a street closure, lane restriction, sidewalk closure, or any other occupancy of the right-of-way shall require a Street Closure Request Form.
    1. The form must be submitted to the Department of Engineering at least 5 calendar days prior to the requested closure date for review.
    2. The Street Closure Request Form shall be accompanied with a Traffic Control Plan that indicates anticipated date and times of restriction or closure, location of closure, barricades, signage, detour route, etc. as well as emergency contact numbers.
    3. If approved, the Department of Engineering will send out a press release to inform the public and other appropriate parties of the closure.
    4. Extended closures on High Volume Streets may require additional traffic control, such as, electronic sign boards to better inform the traveling public of the scheduled closure.
B. The contractor is responsible for proper traffic control and warning signing and devices as required by the IMUTCD, for the duration of construction on any public street. Failure to do so will result in the City providing the necessary equipment and charging the contractor with all related costs.
C. All Temporary Traffic Control Devices shall be in accordance with the current edition of the IMUTCD.
D. All Temporary Traffic Control Devices shall be delivered to the jobsite in good condition meeting the minimum retroreflectivity levels indicated in the IMUTCD.

E. The Department of Engineering reserves the right to reject any sign, barricade or temporary barrier section that is visually deficient.

## VIII-4 TRAFFIC SIGNALS

A. The Contractor shall furnish and install all necessary miscellaneous equipment required to make a completed and operating installation of traffic signals in accordance with the plans, specifications, INDOT Standard Specifications, and the INDOT Standard Drawings, except as revised herein.
B. Traffic Signals shall only be installed by a contractor pre-qualified by INDOT to perform traffic signal installation work.
C. The controller and cabinet shall be equipped with the necessary equipment for fiber and/or radio communication and be compatible with existing City of Mishawaka traffic system software.
D. There shall be at least one signal mounted luminaire per approach to a signalized intersection.
E. Where required, the ITS video system camera shall be mounted on a 50 feet tall steel strain pole located as generally indicated in the plans. Before installation of the pole, the Contractor shall furnish the equipment to raise an observer to planned location, so that the location selected is the most advantageous placement within the intersection area. This may result in the pole and camera being located differently than shown on the plans.
F. All equipment must be approved by the Department of Engineering prior to ordering from manufacturer.

## VIII-5 APPROVED EQUIPMENT

A. All Signal Equipment shall be NEMA TS-2 compliant with the following approved equipment used unless otherwise approved by the Mishawaka Department of Engineering.

| | |
|---|---|
| Cabinet | NEMA TS2, Type 1, P-Cabinet |
| Controller | Econolite ASC/3-2100 with Ethernet port and Purdue Data Logging enabled or Econolite Cobalt 2100 controller |
| Video Detection | FLIR thermal sensors for detection, processed by Autoscope RackVision Terra |
| Conflict Monitor | Reno A&E MMU2-1600GE |
| Load Switches | Reno A&E LS-200 |
| Signal Heads | Polycarbonate and include current Institute of Traffic Engineers (ITE) specified LED inserts for all colors and arrows. |

| | |
|---|---|
| Pedestrian Heads | General Electric GT1 LED 16”x18” with countdown module MOD PS7-CFF1-27A, LEOTEK TSL-PED-16-CIL-P1, or approved equal. |
| Pedestrian Button | Campbell Company AAPS with cabinet located APC |
| Roadway Lighting | For decorative lighting use Holophane Lighting, 14’ decorative pole (Holophane standard black) with Granville II LED Classic Utility Luminaire (spec. provided by Mishawaka Utilities, Electric Division).<br>For standard street lighting use standard 36’ anchor base aluminum black pole assembly with General Electric Evolve LED Roadway Lighting ERLH-O-16-C3-50-D-BLCK. |
| Battery Back-up | TechPower Developments Inc. model DBL-777-MY. Unit shall be housed in a separate cabinet and connected/mounted to the side of traffic controller cabinet. |
| Conduit | PVC meeting the requirements of NEMA TC-2, Type 2. Minimum 2” diameter with no more than 30% of interior area filled by wiring. |
| LED Modules | InterTek-ETL certified to meet ITE specifications |
| Cabinet Ethernet Switch | Moxa model EDS-510A-IGT2SFP-T or Cisco model IE4000-4GC4GP4G-E. |
| Optical Preemption | 3M Opticom |
| ITS Video System | Pan – Tilt – Zoom (PTZ) Axis camera model M5525-E, Q6055-C, Q6075-E, Q6125-LE, or Q6155-E. Cameras shall be compatible with current camera software utilized by the City. |
| Interconnect Cable, Fiber Optic | The Fiber Optic cable shall be Corning Bend-Insensitive (non-gel filled) Single Mode 12-Strand Cable. |
| Speed Limit Indicators | TafficLogix SafePace 475 solar speed limit radar signs with 18” digital display, static “YOUR SPEED” message, and yellow sign color. |

## VIII-6 SIGNAL SERVICE

A. The electric service shall be installed on the side of the controller cabinet, opposite the uninterruptible power supply.
B. The contractor shall obtain a meter base and meter from the Mishawaka Utilities, Electric Division.
C. The contractor shall install the meter base, meter (if required to) and disconnect switch, external to the controller cabinet, including service grounding.
D. The electrical disconnect shall have separate switches for the traffic signal and the signal mounted luminaires.
E. The Mishawaka Utilities, Electric Division will supply underground electric service for the City's electric controller to the meter base.

## VIII-7 HANDHOLES (TRAFFIC/ELECTRICAL)

A. Handholes shall be constructed per the Standard Drawings, Detail IX-1.
B. Handhole covers shall display the name of their respective utility (Traffic Signal, Lighting, Fiber Optic). The wording shall be displayed horizontally across the center of the cover. No additional payments will be allowed for the special message on the handhole cover.

## VIII-8 SPECIAL TRAFFIC SIGNAL COMPONENT COLOR

A. All traffic signal components are to be finished as specified below in an "Architectural Bronze" color. Special care shall be taken to ensure similar colors are used for all the different components.
B. Aluminum mast arms and poles shall be factory anodized with an "Architectural Bronze" finish.
C. Steel strain poles shall be factory galvanized and powder coated in "Architectural Bronze."
    1. All components shall be galvanized and finished in accordance with ASTM A 123.
    2. The powder coating shall be a urethane or triglycidyl isocyanate (TGIC) polyester powder.
    3. The powder coating shall be applied in accordance with all requirements of the manufacturer of the powder coating material to a minimum dry film thickness of 2 mils (0.002").
D. Aluminum controller cabinets, traffic signal heads, and pedestrian signal heads shall be powder coated in "Architectural Bronze."
    1. The powder coating shall be a urethane or triglycidyl isocyanate (TGIC) polyester powder.
    2. The powder coating shall be applied in accordance with all requirements of the manufacturer of the powder coating material to a minimum dry film thickness of 2 mils (0.002").

# SECTION IX – ELECTRICAL

## IX-1 CONSTRUCTION REQUIREMENTS

A. The Contractor shall furnish and install all necessary miscellaneous electrical equipment required to make a completed and operating installation of the proposed electrical/lighting/communication system in accordance with the plans, specifications, and accepted good practice of the industry.
B. All electrical equipment shall be in accordance with the City of Mishawaka Standard Specifications.
C. All electrical conduits shall be of steel material when located within paved surfaces that are exposed to vehicular traffic, including all roadways, driveways, parking lots, etc.
D. Electrical conduits may be PVC material if they are located outside of paved areas and will not receive any vehicular traffic.
E. The installation of all conduits, lighting foundations, light poles, electrical handholes, traffic handholes, fiberoptic, etc. shall be coordinated with the Mishawaka Utilities Electrical Division.
F. All locations of buried conduits and handholes shall be documented and recorded per the requirements of Section I-3 As-Built Record Drawings of these Standard Specifications.

## IX-2 LIGHTING

A. The Contractor shall furnish and install all lighting per the plans, and specifications.
B. All lighting shall meet the requirements of these Standard Specifications and per the details in the Standard Drawings.
C. All lighting located in City right-of-ways or City property shall be approved by the City and coordinated with the Mishawaka Utilities Electrical Division.

## IX-3 HANDHOLES (TRAFFIC/ELECTRICAL)

A. Handholes shall be constructed per the Standard Drawings Detail IX-1.
B. Handhole covers shall display the name of their respective utility (Traffic Signal, Lighting, Fiber Optic). The wording shall be displayed horizontally across the center of the cover. No additional payments will be allowed for the special message on the handhole cover.
C. All locations of conduits and handholes shall be documented and recorded per the requirements of Section I-3 As-Built Record Drawings of these Standard Specifications.

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# SECTION X – EROSION CONTROL

## X-1 EROSION CONTROL

A. Erosion and Sediment Control is required for all work. It shall be the responsibility of the Contractor during construction to prevent erosion from occurring, and sediment from leaving the construction site.

B. The Contractor shall be responsible to comply with all aspects of the City of Mishawaka's "Erosion Control Ordinance" including permitting and bonding as required.

C. The erosion control permitting measures contained herein do not relieve the Contractor from compliance with all aspects of IDEM Construction/Land Disturbance Storm Water Permitting and requirements of the IDEM Construction Stormwater General Permit (CSGP) (previously 327 IAC 15-5, Rule 5).

D. All erosion and sediment control measures provided shall follow the guidance provided in the "Indiana Storm Water Quality Manual – Planning and Specification Guide for Effective Erosion and Sediment Control and Post-Construction Water Quality" available from IDEM, published October 2007, and any supplements thereto and the Standard Drawings.

E. Self-monitoring shall be conducted per the IDEM Construction Stormwater General Permit. Self-monitoring program shall include written evaluation of the project site by the end of the next business day following each measurable storm event and at minimum one time per week. Evaluations shall address maintenance of existing storm water quality measures to ensure proper function, identify any additional measures necessary to remain in compliance, and provide details of corrective actions recommended and completed. Evaluations shall be available to inspecting authority within forty-eight hours of a request.

END OF STANDARD SPECIFICATIONS

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