

**CITY OF GREENFIELD
PUBLIC IMPROVEMENT
DESIGN STANDARDS
AND SPECIFICATIONS MANUAL**

**PUBLIC IMPROVEMENT DESIGN STANDARDS
AND SPECIFICATIONS MANUAL
CITY OF GREENFIELD, INDIANA**

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Public Improvement Design Standards and Specifications Manual

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GENERAL PROVISIONS

100 DEFINITIONS

For the purposes of this ordinance, certain terminology and words used herein shall be interpreted and defined as follows: words in the present tense include the future and vice-versa; words in the singular number include the plural number and vice-versa; the word **BUILDING** includes the word **STRUCTURE** and vice-versa; the word **SHALL** is mandatory and not discretionary; the word **MAY** is discretionary.

ABUTTING Real property to a depth of two (2) ownerships or one-eighth (1/8) of a mile from property in question.

ADJOINING Sharing an edge or a boundary; touching.

AGRICULTURAL LAND DISTURBING ACTIVITIES means the disturbance of land for the production of animal or plant life, including forestry, pasturing of livestock, and planting, growing, cultivating, and harvesting crops for human or livestock consumption. This does not include the construction of farm facilities such as dwellings, barns, sheds or other structures.

ALLEY A permanent public service way providing only a secondary means of vehicular access to the back or side of property otherwise abutting a street. An alley does not include a "frontage street" or "commercial service drive."

BLOCK A unit or property bounded by streets and/or railroad rights-of-way, waterways, or other definite barriers.

BLOCK FRONTAGE Property having frontage on one side of a street and lying between the two nearest intersecting or intercepting streets, or a street with a railroad right-of-way, waterway, or other definite barrier.

BUILDABLE AREA The portion of the lot remaining after required yards or setback lines have been provided. Buildings may be placed in any part of the buildable area, but if there are limitations on the amount of the lot which may be covered by buildings, some open space may be required within the buildable area.

BUILDING A structure having a roof supported by posts, poles, columns or walls, for the shelter, support, enclosure or protection of persons, animals, chattels, or property. When separated by party walls, without any opening through walls, each portion of such a building shall be considered a separate structure.

BUILDING, DETACHED A building having no structural connection with another building.

BUILDING, FRONT LINE OF The actual line of any portion of the building, including the overhang, nearest the front lot line, in contrast to the front setback line.

BUILDING LINE or **BUILDING SETBACK LINE** The line which establishes the minimum depth of yard, beyond which no building or structure is permitted, as measured from the right-of-way line or the lot line. For the purpose of this chapter the proposed right-of-way lines according to the thoroughfare plan of current adoption will be considered as the street lines for lots bordering such streets and thoroughfares (See §155.033 for exceptions.)

BUILDING PERMIT A permit signed by the Zoning Administrator stating that a proposed improvement complies with the provisions of Chapter 150 and such other parts of this Code of ordinances, as may be applicable.

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CERTIFICATE OF OCCUPANCY A certificate signed by the Zoning Administrator stating that the occupancy and use of land or a building or structure referred to therein complies with the provisions of this Code.

CITY The City of Greenfield, Indiana.

CITY COUNCIL The City Council of the City of Greenfield.

COMMERCIAL SERVICE DRIVE A street other than a frontage street that runs parallel or generally parallel to the frontal street and mainly located in the space to the rear of the buildings.

COMMISSION or **PLAN COMMISSION** The Greenfield Advisory Plan Commission.

COMMON COUNCIL The Common Council or City Council of the City of Greenfield.

COMMON OPEN SPACE Open space within or related to a development, not in individually owned lots or dedicated for public use, but which is designated and intended for the common use or enjoyment of the residents of the development.

COMPREHENSIVE PLAN The comprehensive plan for Greenfield, Indiana, (Resolution 1997-10) adopted 1997, according to the requirements of IC 36-7-4-500 et seq.

CONSERVATION DISTRICT Hancock County Soil and Water Conservation District.

COUNTY Hancock County, Indiana.

COVENANTS A series of formal, sealed, binding agreements or laws.

CUL-DE-SAC, **COURT** or **DEAD-END STREET** A residential street having one end open to traffic and being permanently terminated by a vehicle turn-around.

DEVELOPMENT Any man-made change to improved or unimproved real estate including, but not limited to:

- a. construction or placement of a building greater than 400 sq. ft, construction of any addition to a building, and reconstruction.
- b. installing a manufactured home at a site, preparing a site for a manufactured home or installing a travel trailer on a site for more than 180 days;
- c. installing utilities, erection of walls and fences, construction of roads, or similar projects;
- d. construction of flood control structures such as levees, dikes, channel improvements, etc.;
- e. mining, dredging, filling, grading, paving, excavation, or drilling operation;
- f. construction and/or reconstruction of bridges or culverts;
- g. storage of materials; or
- h. any other activity that might change the direction, height, or velocity of flood or surface waters.

"Development" does not include activities such as the maintenance of existing buildings and facilities such as painting, re-roofing resurfacing roads; or gardening, plowing, and similar agricultural practices that do not involve filling, grading, excavation, or the construction of permanent buildings.

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EASEMENT A right of the owner of one parcel of land, by reason of such ownership, or a right of the public, to use the land of another for a special purpose as designated; a strip of land to be used by the general public, a corporation, a utility company, or a certain person for a specific reason, for purposes of providing services to property. The property owners shall be responsible for maintenance within easements on their property.

EROSION means the detachment and movement of soil, sediment, or rock fragments by water, wind, ice, or gravity.

EROSION CONTROL MEASURE means a practice or a combination of practices to control erosion and resulting sedimentation.

EROSION CONTROL PLAN means a written description of pertinent information concerning erosion control measures designed to meet the requirements of this ordinance.

FRONTAGE That side of a lot abutting on a street or public way and ordinarily regarded as the front of the lot. Lots shall not be considered to front on stub ends of streets and in the case of corner lots will be considered to front on both intersecting streets.

FRONTAGE STREET A street that runs parallel to the public street or highway and located within the space between the building(s) and the public street or highway.

IMPROVEMENT LOCATION PERMIT A permit which may be combined with a **BUILDING PERMIT** signed by the Zoning Administrator stating that a proposed improvement or use complies with the provisions of this chapter of this Code. A **TEMPORARY IMPROVEMENT LOCATION PERMIT** is an **IMPROVEMENT LOCATION PERMIT** authorized by the Board of Zoning Appeals or staff with a definite time limit attached thereto.

JURISDICTION OF THE PLAN COMMISSION The territory within the City of Greenfield, Indiana, the boundaries of which are shown on the Zone Map, dated 1997, as amended, which includes all of the area over which this chapter is effective.

LAND DISTURBING ACTIVITY means any man-made change of the land surface, including removing vegetative cover, excavating, filling, transporting, and grading.

LOT A parcel, plat, tract, or area of land accessible by means of a public way. It may be a single parcel separately described in a deed or plat which is recorded in the office of the County Recorder, or it may include parts of, or a combination of such parcels when adjacent to one another and wed as one, or it may be a parcel of land described by metes and bounds. However, in no case shall any residual lot or parcel be created which does not meet the requirements of this chapter. In determining lot area and boundary lines, no part thereof within a street shall be included.

LOT AREA The total horizontal area within the lot lines of a lot, computed exclusive of any portion of a street, existing or proposed.

LOT, CORNER A lot at the junction of and having frontage on two or more intersecting streets. For the purpose of this Ordinance, corner lots are considered to have two (2) front yards and two (2) side yards.

LOT COVERAGE The total area of a lot that is covered, roofed, occupied, or enclosed by principal and accessory buildings and structures, expressed as a percentage of the lot area.

LOT, DEPTH OF The mean horizontal distance between the front lot line and the rear lot line.

LOT FRONTAGE The linear distance of a lot measured at the front lot line where said lot abuts a street, measured between side lot lines.

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LOT, INTERIOR A lot other than a **CORNER LOT** or **THROUGH LOT**.

LOT LINE The property line between two established parcels of land or one parcel and a public right-of-way or place.

LOT LINE, FRONT A line separating the lot from the public way.

LOT LINE, REAR A lot line which is opposite and most distant from the front lot line and, in the case of an irregular or triangular shaped lot, a line ten feet in length within the lot, parallel to and at the maximum distance from the front lot line.

LOT LINE, SIDE Any lot boundary line not a front lot line or a rear lot line.

LOT, THROUGH A lot having frontage on two parallel, or approximately parallel streets. Also **DOUBLE FRONTAGE LOT**.

LOT, WIDTH The dimension of a lot, measured between side lot lines on the front building line.

LOT OF RECORD A lot which is part of a subdivision, the map of which has been recorded in the office of the County Recorder, or a parcel of unplatted land, the deed to which has been recorded in the office of the County Recorder, provided that such lot was of a size that met the minimum dimensions for lots in the district in which it was located when recorded, or was recorded prior the effective date of zoning.

MODIFICATIONS FROM DEVELOPMENT STANDARDS A device which grants a petitioner relief from certain provisions of the Subdivision Control Ordinance when, because of the particular physical surroundings, shape, or topographical condition of the property, compliance would result in a particular hardship upon the owner, as distinguished from a mere inconvenience or a desire to make more money.

OWNERS ASSOCIATION A corporation or other entity that is organized and operated exclusively for the benefit of two (2) or more persons who each own a lot in fee simple and acts, in accordance with the articles, bylaws, and other documents governing the entity to:

- a. acquire, transfer, manage, repair, maintain, or engage in construction on or in the land and improvements on the land related to the use of the lots owned by the members of the corporation;
- b. purchase insurance to cover a casualty or an activity on or in the land and improvements on the land; or
- c. engage in an activity incidental to an activity described in (a) or (b).

PERSON A corporation, firm, partnership, association, organization, or any other group acting as a unit, as well as a natural person.

PETITIONER Any person, firm, or corporation engaged in developing or improving a tract of land which complies with the definition of a subdivision as defined in this chapter.

PLAN COMMISSION STAFF The Zoning Administrator and other persons the Plan Commission has employed to advise them on matters pertaining to planning and zoning.

PLAT A series of drawings, certificates and covenants indicating the subdivision or re-subdivision of land, either filed or intended to be filed for record.

PRIMARY APPROVAL An approval that may be granted by the Plan Commission and signed by the President of the Plan Commission on a plat of a subdivision which complies with the procedures, standards of improvements, and conditions have been met by the applicant as required by this code. Primary approval is a final decision of the Plan Commission inasmuch as it may be subject to judicial review.

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PUBLIC WAY A street, frontage street, or road, not an easement or an alley.

REAR ACCESS DRIVE A drive which accesses the street or right-of-way through the rear of the property.

REPLAT A subdivision or plat, the site of which as heretofore been platted or subdivided with lots or parcels of land. It may include all or any part of a previous subdivision or plat.

RUNOFF means the portion of precipitation from such sources as rainfall, snow melt, or irrigation water that flows over the ground surface.

SECONDARY APPROVAL An approval that may be granted by the Plan Commission and signed and certified by the President of the Plan Commission on a plat of the subdivision which the Plan Commission has already given its primary approval before it can be filed with the County Auditor and recorded by the County Recorder, and the improvements and installations have been completed as required by this code or, if the improvements and installations have not been completed as required, the applicant therefore has provided a bond or other proof of financial responsibility in accordance with the requirements of this subdivision code.

SETBACK The required minimum horizontal distance between the building line and the related front, side, or rear property line.

SITE means the entire area included in the legal description of the land on which land disturbing activity has been proposed in the permit application.

STREET A public right-of-way, other than an alley, or place dedicated or otherwise legally established for public use, usually affording the principal means or vehicular travel or passage.

STREET, ARTERIAL A street designated for large volumes of traffic movement. Certain arterial streets may be classed as limited access highways to which entrances and exits are provided only at controlled intersections and access is denied to abutting properties. Arterial streets are divided into two categories: primary and secondary in accordance with Section 153 of the Code of Ordinances.

STREET, COLLECTOR A street planned to facilitate the collection of traffic from residential streets and to provide circulation within neighborhood areas and convenient ways for traffic to reach arterial streets.

STREET, LOCAL A street designated primarily to provide access to abutting properties, usually residential. Certain residential streets may be marginal access streets parallel to arterial streets, which provide access to abutting property and ways for traffic to reach access points on arterial streets.

SUBDIVISION

- a. The division of any parcel of land shown as a unit, as part of a unit, or as contiguous units on the last preceding transfer of ownership thereof, into two or more parcels, sites, or lots for the purpose, whether immediate or future, of transfer of ownership; provided, however, that the division or partition of land into parcels, not involving any new street or easements of access, and the sale or exchange of parcels between adjoining lot owners, where such sale or exchange does not create additional building sites, shall not be considered a subdivision; or
- b. The improvement of one or more parcels of land for residential, commercial or industrial structures or groups of structures involving the subdivision and allocation of land as streets or other open spaces for common use by owners, occupants or lease holders or as easements for the extension and maintenance of public sewer, water, storm drainage, or other public utilities and facilities.

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TECHNICAL ADVISORY COMMITTEE The Technical Advisory Committee of the Plan Commission is a committee whose purpose is to make recommendations to the Greenfield Advisory Plan Commission and Board of Zoning Appeals concerning standards and design and impact upon streets, utilities, facilities for planned unit development proposal, subdivision plans, and development plans; the Board of Zoning Appeals may also request the committee to review variance requests and conditional uses. Refer to the Plan Commission Rules of Procedure regarding the membership of the Technical Advisory Committee.

THOROUGHFARE PLAN The part of the comprehensive plan for the city, now or hereafter adopted, which includes a major street and highway plan and sets for the location, alignment, dimensions, identification, and classification of existing and proposed streets, highways, and other thoroughfares for the City within its environs.

YARD A space on the same lot with a building, which is open, unoccupied and unobstructed by structures, except as otherwise provided in this Code.

YARD, FRONT A yard extending across the full width of the lot, unoccupied other than by steps, walks, terraces, driveways, lamp posts, and similar appurtenances, the depth of which is the distance between the front lot line and the building line.

YARD, REAR Yard extending across the full width of the lot between the rear of the principal building and the rear lot line unoccupied other than by accessory buildings, and steps, walks, terraces, driveways, lamp posts and similar structures, the depth of which is the least distance between the rear lot line and the rear of such principal building.

YARD, SIDE A yard between the building and side lot line, extending from the front yard or from the front lot line where no front yard is required, to the rear yard, unoccupied other than by architectural appurtenances projecting not more than 24 inches from the building, or open or lattice-enclosed fire escapes or fireproof outside stairways, projecting not more than four feet, and certain accessory uses in accordance with the provisions of this chapter. The width of the required side yard is measured horizontally at 90 degrees with the side lot line from the nearest point of the building.

ZONE MAP A map entitled "Zone Map, Greenfield, Indiana," dated 1989 and any amendments thereto.

ZONING ADMINISTRATOR The official, or his designee, appointed by the Mayor of Greenfield and authorized to enforce this chapter of the Code and other chapters pertaining to planning and zoning and building construction.

ZONING ORDINANCE An ordinance and zone map which divides the jurisdiction of the Plan Commission into districts, with regulations and requirements and procedures for the establishment of land use controls, and which indicates where subdivision of land may occur; specifically, chapter 155, Zoning Code.

REQUIREMENTS FOR PLATS

200 CONSTRUCTION PLANS, SPECIFICATIONS, AND SUPPLEMENTAL INFORMATION

- A. The petitioner shall submit the following Engineering Plans and Specifications and other required information with the application:
1. Profiles, typical cross-sections, and specifications for proposed street and other right-of-way improvements.
 2. Profiles and locations and other explanatory data concerning the installation of street lighting, sanitary sewage, storm drainage, and water distribution systems.
 3. A description of the portion of the overall plat of the subdivision intended to be filed for records, including a program for the progressive developments of the entire area contained in the overall plat.
 4. Cost estimated by item for all public improvements by the petitioner and attested to by a registered land surveyor or a registered professional engineer.
- B. The petitioner shall submit the following supplementary information with the application:
1. Statement of the proposed use of lots, stating the type of residential buildings with the number of proposed dwelling units, type of business or industry, so as to reveal the effect of the development on public infrastructure and/or City services.
 2. A statement concerning the method of controlling erosion before, during, and following construction, i.e., temporary seeding, siltation basins, mechanical erosion devices, and other similar means that meet the Hancock County Soil and Water Conservation guidelines for urban development or Indiana Department of Environmental Management standards when Rule 5 (327 IAC 15-5) approval is required. (See (C), herein.)
 3. The petitioner shall be responsible for providing a drainage plan which includes on-site retention or detention of stormwater generated. The proposed system shall be sufficient to retain runoff of surface water and runoff water including not only that water which falls onto the area within the limits of the tract to be subdivided but also that water which runs onto the area from adjacent lands or runs through onto the area by means of tile drains or open ditches only as it exists at time of platting. Calculations shall assume a 10-year storm frequency volume for upstream watershed areas draining onto the site.
 4. If floodway is involved, a statement from the Indiana Department of Natural Resources, Division of water, concerning construction in flood-way, including flood plain high water marks and the like that show all locations of 100 year base flood elevation for each lot.
 5. Show other features or conditions that would affect the subdivision favorably or adversely.
- C. Soils Stabilization Plan.

Because erosion constitutes a severe hazard due to sedimentation to areas lying downstream, adjoining properties, public facilities, and public waters, and this erosion removes fertility, cuts gullies, washes out roads, and fills drainage ditches on developing areas, a program of erosion control is needed to control this present and impending problem. The petitioner is responsible for complying with Rule 5 (327 IAC 15-5), when applicable, before submitting plans to the City of Greenfield.

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1. All disturbed areas shall be shaped, graded, fertilized, seeded, and mulched if the disturbed areas will be exposed and undeveloped during the period of November 1 to April 1 to protect against erosion. The smallest practical area of land (that section to be developed) should be exposed at any one time during development.
2. Temporary vegetation or mulching will be necessary to protect critical areas exposed during development.
3. Sediment basins (debris basins, desilting basins, or silt traps) will be installed and maintained as recommended by the Hancock County Soil and Water Conservation District (District), assisted by the United States Department at Agriculture Soil Conservation service. These basins will be used to remove sediment from runoff waters from land undergoing development.
4. The permanent final vegetation and structures shall be installed as soon as practical in development.
5. The development plan shall be fitted to the topography and soils so as to minimize the erosion potential.
6. Wherever feasible, natural vegetation shall be retained and protected.
7.
 - a. Consultative technical assistance and information in establishing the planned seeding, erosion, sediment, and water management control measures will be furnished by the District on request of the developers or their advisors. This assistance is provided consistent with current operating policies and available resources of all agencies assisting the Conservation District.
 - b. Construction in flooding areas. Information with respect to the extent of area in the vicinity of stream and rivers that are the flood-ways for 100 year frequency floods or geographical boundary of bottom land soils that parallel rivers and stream which are defined by a soil survey to have flooding hazard shall be submitted to the Plan Commission. Construction planned within the confines of the areas subject to flooding must be approved by the Department of Natural Resources.

(Ord. 1979-24, passed 12-13-79; Am. Ord. 19832, passed 2-10-83)

PRINCIPLES AND STANDARDS OF DESIGN

300 STREETS

- A. Proposed streets should be adjusted to the conformation of the land and soil conditions so as to produce usable lots and streets of reasonable gradient.
- B. Multiple means of ingress and egress to a subdivision shall be provided in all developments with more than 49 lots. Subdivisions with 50 to 150 lots shall have at least one additional entrance. Subdivisions with more than 150 lots shall provide no fewer than three entrances, or two entrances with a connection to a neighboring subdivision or development.
- C. The Owner shall dedicate temporary turn-around areas at the terminus of any stub street over two lots in length. A temporary right of way easement for the turn-around area must be recorded and cross referenced on the record plat. The easement dedication shall be for a radius of 50 feet and shall state that the owner of the property shall maintain a 40' wide gravel temporary turn around within the easement until the permanent street is extended and constructed into the adjacent section. Upon connection to a street that has been accepted for public maintenance, the temporary easement shall be automatically released. If the streets are not extended within 3 years from the date of plat recording, the Greenfield Board of Public Works and Safety may require that the owner remove the gravel turn-arounds and a permanent cul-de-sac be constructed and paved to City street specifications, improved with sidewalks and utility extensions, and re-dedicated to the public as permanent right of way.
- D. The street and alley layout shall conform to the thoroughfare plan for the development of the neighborhood in which the proposed subdivision is located and shall provide access to all lots and parcels of land within the subdivision. Where streets cross other streets, jogs shall not be created. The minimum distance between center lines of parallel or approximately parallel streets intersecting a cross street should be 150 feet.
- E. Proposed streets shall be extended to the boundary line of the tract to be subdivided so as to provide for normal circulation of traffic within the vicinity.
- F. Wherever there exists a dedicated or platted portion of a street or alley adjacent to the proposed subdivision, the remainder the street or alley to the prescribed width shall be platted within the proposed subdivision.
- G. Widths of arterial streets and feeder streets shall conform to the widths specified in the thoroughfare plan.
- H. The minimum right-of-way of residential streets, marginal access streets, or cul-de-sacs shall be 50 feet. All cul-de-sacs shall terminate in a circular right-of-way with a minimum diameter of 100 feet, or other arrangement for the turning of all vehicles conveniently within the right-of-way.
- I. Alleys shall be discouraged in residential districts, and shall be at least 20 feet in width.
- J. The center lines of streets should intersect as nearly at right angles as possible, but in no case shall an angle of less than 60 degrees be created.
- K. If the smaller angle of intersection of two streets is between 60 degrees and 90 degrees, the radius of the arc at the intersection of property lines shall be increased as deemed advisable by the Plan Commission.
- L. Intersections of more than two streets at one point shall be avoided.
- M. Where parkways or special types of streets are involved, the Plan Commission may apply special standards to be followed in their design.

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- N. Whenever the proposed subdivision contains or is adjacent to a highway designated as a 'controlled access highway' by the appropriate highway authorities, or a street so designated by the thoroughfare plan, provision shall be made for a frontage access-way or a parallel access-way situated at a distance acceptable for the appropriate use of the land between the highway and such access-way, located to connect with adjacent properties or access-ways or streets. The access-way shall be designed to make the best use of access points with the "controlled access highway." Frontage access-ways shall be platted to a minimum width of 24 feet and paved to their full width (when located adjacent to the controlled access highway); otherwise, the optional parallel access-way shall be platted to a width of 40 feet and paved to a width of at least 24 feet. Access points shall be platted and improved in accordance with the street requirements in this code.
- O. Unobstructed sight distances measured from a point five feet above the proposed grade line, to permit horizontal visibility on all streets, must be established along the center line of such streets as follow:

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1. Arterial streets: 500 feet.
 2. Feeder streets, residential streets, and parkways: 300 feet
- N. Curvature measured along the center line shall have a minimum radius as follows:
1. Arterial streets: 500 feet.
 2. Collector streets: 400 feet
 3. Feeder streets and parkways: 300 feet
 4. Residential streets: 150 feet.
 5. Residential streets shorter than 500 feet: 100 feet.
- O. Between reversed curves on arterial streets there shall be a tangent of not less than 100 feet and on feeder and residential streets and parkways such tangent shall be not less than 40 feet.
- P. Maximum grades for streets shall be as follows:
1. Arterial streets and parkways, not greater than 5%.
 2. Feeder and residential streets and alleys, not greater than 8%.
- Q. The minimum grade of any street gutter shall not be less than 0.4%.
- R. The maximum length of a cul-de-sac shall be 600 feet.

(Ord. 1979-24, passed 12-13-79; Am. Ord. 1988-29, passed 12-8-88)

302 BLOCKS

- A. Blocks shall not exceed 650 feet in length.
- B. Blocks shall be of sufficient width to permit two tiers of lots of appropriate depth, except where an interior street parallels a limited access highway or an arterial street or a railroad right-of-way.

(Ord. 1979-24, passed 12-13-79)

304 LOTS

- A. All lots shall abut a street.
- B. Side lines of lots shall be approximately right angles to straight streets and on radial lines and curved streets. Some variation from this rule is permissible, but pointed or very irregular lots should be avoided.
- C. Double frontage lots should not be platted, except that where desired along arterial streets, lots may face on an interior street and back on such thoroughfares. In that event a planting strip or a screen at least 20 feet in width shall be provided along the back of the lot.
- D. Widths and areas of lots shall be not less than that provided in the zoning code, Chapter 155, for single-family dwellings for the district in which the subdivision is located.

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- E. Corner residential lots shall be wider than normal in order to permit appropriate setbacks from both streets, in order to provide property spacing for a dwelling of the same shape that would fit on other lots in the subdivision.

(Ord. 1979-24, passed 12-13-79)

306 EASEMENTS

Where alleys are not provided, easements for utilities shall be provided in accordance with provision of this chapter. Such easements shall have minimum widths of 20 feet, and where located along lot lines, one-half of the width shall be taken from each lot. Before determining the location of easements, the plan shall be presented to the local utility liaison committee to encourage recommendations for their proper placing for the installation of all utility services. No structures shall be placed within easements.

(Ord. 1979-24, passed 12-13-79)

308 COMMON OPEN SPACES

Where sites for parks, playgrounds, or other public uses are located within the subdivision, the Plan Commission may request their dedication for such purposes, or their reservation for a period of one year following the date of the approval of the record plat. In the event a governmental agency concerned passes a resolution expressing its intent to acquire the land so reserved, the reservation period shall be extended for an additional six months.

Common open spaces less than two acres in size shall be maintained by the owners association of the proposed subdivision. Common open spaces for recreational uses two acres or larger shall be dedicated to and maintained by the City of Greenfield Parks and Recreation Department. The Park Board has the right to refuse any open space areas offered for dedication. If the Park Board refuses a dedication offer, the owners association shall be responsible for the maintenance the common open space.

(Ord. 1979-24, passed 12-13-79; Am. Ord. 1983-2, passed 2-10-83)

310 BICYCLE AND PEDESTRIAN FACILITIES

The Proposed Thoroughfare Plan Map in the Comprehensive Plan seeks to connect the many of the residential and commercial nodes of the City through a local network of on- and off-street bicycle and pedestrian facilities. Where a subdivision or development abuts any of the areas identified for bicycle and pedestrian facilities, the petitioner shall provide a connection to the facilities. Where a subdivision or development contains a segment of the identified bicycle and pedestrian systems, the petitioner shall construct the identified facilities. All connections to and segments of the bicycle and pedestrian systems shall be designed and constructed to the standards shown on the details in Appendix A.

Off-street multi-use pathways occur along the Conrail Rail-Trail and the floodplains of Brandywine Creek, Little Brandywine Creek, and Potts Ditch. On-street bicycle facilities are identified throughout the City and in the high growth node northeast of the intersection of State Road 9 and Interstate 70. While the type of bicycle and pedestrian facility provided must be determined based upon individual site conditions, the City prefers to separate vehicular and non-vehicular modes of transit. Therefore, the preference for providing bicycle and pedestrian facilities is as follows:

1. Multi-use pathways (see detail 310-01)
2. Designated bicycle lanes (see detail 310-02)
3. Wide curb lanes (see detail 310-03)
4. Shared shoulders (see detail 310-04)

STANDARDS OF IMPROVEMENTS

400 CONFORMITY REQUIRED

All subdivisions shall conform to the standards of improvements of this manual, which shall be installed under the supervision of a city inspector. Standard construction details are provided in Appendix A.

(Ord. 1979-24, passed 12-13-79; Am. Ord. 1983-2, passed 2-10-83)

402 MONUMENTS AND MARKERS

- A. In accordance with 865 IAC 1-12, monuments and markers shall be placed so that the center of the monument or marker shall coincide exactly with the intersection of lines to be marked and shall be set so that the top of the monument or marker is level with the finished grade.
- B. Monuments shall be set:
 - 1. At the intersection of lines forming angles in the boundary of the subdivision.
 - 2. At the intersection of street center lines and at the beginning and ending of all center line curves.
- C. Markers shall be set:
 - 1. At the beginning and ending of all curves along street property lines.
 - 2. At all points where lot lines intersect curves, either front or rear.
 - 3. At all angles in property lines of lots.
 - 4. At all other lot corners not established by a monument.
- D. Monuments shall be of stone, pre-cast concrete, or concrete poured in place with minimum dimensions of 4 inches by 4 inches by 30 inches, set vertically in place and when placed in street center lines a 30-inch long copperweld will be used. They shall be marked on top with an iron or copper dowel set flush with the top of the monument, or deeply scored on top with a cross. Markers shall consist of iron pipes or steel bars at least 30 inches long and not less than 5/8-inch in diameter.

(Ord. 1979-24, passed 12-13-79; Am. Ord. 196829, passed 12-6-88)

404 STREETS

- A. Streets, and alleys where provided, shall be completed to grades shown on plans, profiles, and cross sections provided by the petitioner and prepared by a registered professional engineer or registered land surveyor and approved by the Plan Commission.
- B. Residential streets shall be surfaced to a minimum width of 30 feet, measured back-to-back of curb. Streets classified as an 'arterial' or 'feeder street' as set forth in Section 152.02, shall be surfaced to a minimum width of 36 feet measured back-to-back of curb. The Plan Commission may require the petitioner to provide street surfacing on streets which are proposed to be extensions of existing paved streets, and which exceed the minimum dimensions set forth above, to the full width of the existing paved street. Alleys shall be surfaced to a width of 12 feet. Cul-de-sac turnarounds shall be fully paved to a diameter of 76 feet.

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- C. The streets shall be graded, surfaced, and improved to the dimensions required by the cross sections and the work shall be performed in the manner prescribed in "Standard Specifications for the Indiana Department of Transportation," latest issue (hereinafter referred to as the Standard Specifications). See Figure 3, TYPICAL CROSS SECTIONS. A copy of the current Standard specifications is on file in the office of the City Engineer.
- D. The sub-grade shall be prepared in compliance with Section 207 of the Standard Specifications.
- E. The sub-base, where required, shall be prepared in compliance with Section 304 of the Standard Specifications. Special sub-base drainage in areas of cuts, swales, and fills shall be as set out in the approved plans and specifications.
- F. The street surface shall be of Portland cement concrete or hot asphalt concrete. Portland cement concrete materials and construction shall be in accordance with Section 501 of the Standard Specifications and division (1), below. Hot asphalt concrete materials and construction shall be in accordance with Section 403 of the Standard Specifications and division (2), below. In the case of a proposed alternative method, discrepancy, omission, or duplication in the required specification standards, the decision of the City Engineer shall be sought and considered final.

1. Rigid type pavement (Portland cement concrete)

- a. Minimum design characteristics of street pavement shall be as follows:

- i. 6% air entrained
- ii. 28-day compressive strength = 4000 p.s.i.
- iii. 28-day flexural strength = 550 p.s.i.
- iv. Thickness to conform to the following schedule:

| | <u>Thickness</u> | | |
|--------------------|---|--------------------|--------|
| | Residential | Collector/Arterial | Feeder |
| Concrete | 6" | 7" | 8" |
| Aggregate Sub-base | Subject to review by the City Engineer | 4" | 4" |

- b. Portland cement concrete pavement shall be in accordance with Section 501 of the Standard Specifications. In addition, the following shall govern and be met:
 - i. The sub-grade shall conform to Section 501.5 and Section 207 of the Standard Specifications. Sub-grade shall be moist but not muddy at the time the concrete is placed. If required, it shall be sprinkled, but the method of sprinkling shall be such that mud or pools of water will not be formed.
 - ii. Sub-base, if required, shall meet the above minimum thickness requirements and conform to Section 304 of the Standard Specifications.
 - iii. Weakened plane or dummy transverse contraction joints shall be placed not to exceed 20-foot spacing. A transverse contraction joint shall be placed at every catch basin and manhole in line of pavement. The location of manholes, and the like, in the pavement shall determine the exact location of joints. All joints must extend throughout sidestrips to full width of pavements. Transverse contraction joints will be a groove and conform to Section 501.14 of the Standard Specifications.

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- iv. Whenever the width between form of the pavement under construction is greater than 13 feet, longitudinal joints shall be constructed so as to divide the pavement into strips not to exceed 13 feet each. Work shall conform to Section 501.14 of the Standard Specifications.
- v. Expansion joints, with approved dowel bar assembly, shall be placed at intersections where shown on the plans and shall conform to Section 501.15.
- vi. Concrete shall be machine finished except on widened portions, intersections, or other places where hand finishing will be permitted if authorized. Finishing machines or vibrating strike-boards of design other than as specified in the Standard Specifications will be permitted only if work of equal quality as set out in these specifications is obtained. Authorization prior to construction is required. Work shall conform to Section 501.15 of the Standard Specifications.
- vii. Curing with approved impervious membrane or sealing compounds shall be required, conforming to Section 501.17 of the Standard Specifications.

2. Hot asphalt concrete pavement

- a. Minimum design characteristics of street pavement shall be as follows with thickness to conform to the following schedule:

| | <u>Thickness</u> | | |
|--------------------|--|------------------|----------|
| | Residential | Collector/Feeder | Arterial |
| Surface | 1" | 1" | 1" |
| Binder | 2" | 2" | 2" |
| Base | 4" | 6" | 8" |
| Total Asphalt | 7" | 9" | 11" |
| Aggregate Sub-base | Subject to review by the City Engineer | 4" | 4" |

- b. Asphalt pavement shall be in accordance with Section 403 of the Standard Specifications. In addition, the following shall be met:
 - i. The sub-grade shall conform to Section 403 of the Standard Specifications.
 - ii. Sub-base, if required, shall meet the above minimum thickness requirements and conform to Section 403 of the Standard Specifications.
 - iii. Base, binder, and surface courses shall meet the above minimum requirements and conform to Section 403 of the Standard Specifications.
 - iv. Seal coats, prime coats, and tack coats shall conform to Section 403 and Sections 407, 408, and 409 (as applicable) of the Standard Specifications.

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- G. Samples for testing purposes shall be taken as required by the appropriate section of the Standard Specifications. All tests shall be performed in accordance with the appropriate section of the Standard Specifications. All testing shall be performed by a certified agency approved by the City Engineer. The developer shall pay all testing costs. A complete certified copy of all records shall be provided by the city. The city reserves the right to core the pavement before acceptance.
- H. All work must be acceptable to and meet all the requirements of the city prior to acceptance by the city. Upon the completion of all improvements and installations as required by this chapter, the developer shall furnish the Board of Public Works and Safety with the proper bonds and an engineer's certification that the improvements and installations have been constructed, installed, and completed in compliance with the requirements of this chapter. In addition, a letter signed by the City Engineer shall be presented to the Board of Public Works and Safety stating the improvements to have been constructed, installed, and completed in compliance with the requirements of this code.

(Ord. 1979, passed 12-13-79; Am. Ord. 1983-2, passed 2-10-83; Am. Ord. 1988-5, passed 4-14-88; Am. Ord. 1988-29, passed 12-8-88)

406 SANITARY SEWER SYSTEM

- A. The plans for the installation of a sanitary sewer system shall be provided by the petitioner and approved by the Greenfield Board of Public Works and Safety. Upon the completion of the sanitary sewer installation and one week prior to acceptance, the plans for such system as built shall be filed with the Plan Commission staff.

B. SANITARY SEWER SYSTEM STANDARD SPECIFICATIONS

1. GENERAL

a. SCOPE

This specification addresses the City of Greenfield standards for materials and installation of sanitary sewers including gravity sewers, laterals, force mains, manholes, grease traps and appurtenances. The Contractor/Developer shall be responsible for all labor, material and equipment required to complete the work as specified.

b. DEFINITIONS

- i. The following definitions/abbreviations shall apply,
- ii. ASTM – American Society for Testing and Materials, latest edition
- iii. City – City of Greenfield
- iv. Engineer – Greenfield City Engineer
- v. INDOT – Indiana Department of Transportation
- vi. NPDES – National Pollutant Discharge Elimination System

c. SUBMITTALS

- i. Product data sheets shall be submitted on all Contractor supplied materials including pipe, manholes, pipe couplings, wyes, tees, and other miscellaneous products proposed for use.
- ii. Submit certified sewer testing results.

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- iii. Record drawings shall be supplied to the City within 90 days of the completion, testing, and acceptance of the sanitary sewers. The record drawings shall be submitted as hard copy as well as CAD drawing file.

d. QUALITY ASSURANCE

i. Codes and Standards

- a. Comply with ASTM and INDOT Standard Specification standards to the extent indicated by reference herein. All references shall imply the latest revision.
- b. Comply with requirements of Greenfield authorities having jurisdiction for work along property lines and on public property.

ii. Installers Qualifications

Contractor shall have no less than three years experience in the installation of sanitary sewers systems of the type required.

e. PROJECT CONDITIONS

Should unknown active utilities be broken during excavation work, stop work immediately. Any drainage tile, regardless of its apparent condition, that is damaged or severed during construction, must be repaired. Do not proceed further with work until decision has been reached regarding repair, removal, or relocation of utilities. Notice must be made to the Greenfield Wastewater Utility.

f. SEQUENCING AND SCHEDULING

48 hour notice must be given to the Wastewater Utility prior to the start of any construction. Contractor shall submit proposed detailed construction sequence including schedule for bypass pumping and connection to existing sanitary sewer system.

g. ISOLATION OF NEW IMPROVEMENTS

The first manhole upstream from the connection to the existing sanitary sewer system must be plugged until time of testing. Removal of the plug must be witnessed by a Wastewater Utility representative.

2. PRODUCTS

a. MAINLINE SEWERS

- i. Pipe for mainline sewers shall be a minimum 8-inch diameter or larger as indicated for the particular project. Unless otherwise approved by the City, the mainline sewers shall be PVC pipe conforming to ASTM D 3034 (SDR 35) with cell classification 12454 "B" or "C". Pipe shall be the integral wall bell and spigot type with elastomeric seal joints.
- ii. When the pipe depth is greater than twenty-five (25) feet, the Project Engineer shall verify the pipe material selected is acceptable for the application. Upon request, the Project Engineer shall submit all calculations verifying the pipe selected is acceptable.

b. BUILDING LATERALS

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- i. Pipe for building laterals shall be a minimum 6-inch PVC meeting the requirements of ASTM D 3034, SDR 35. Pipe shall have flexible gasket push-on compression type joints.
 - ii. Cleanout shall be provided for each lateral. Cleanout shall be 6-inch diameter minimum. All lateral connections to sanitary sewer mains or to an existing sewer stub-out, shall be installed in a manner that a direct route from the building structure to the main or stub must be taken. If in the opinion of the City Engineer or his authorized representative, a lateral is constructed with the use of unnecessary fittings or turns, a contractor may be required to relay the sewer lateral in an approved, more direct route.
- c. MANHOLES
- i. Manholes shall be precast concrete complying with ASTM C 478. The minimum inside diameter shall be 48 inches. Manhole sections shall be jointed with rubber type O-ring gaskets. A 6-inch minimum width of butyl rubber coating on exterior of manhole shall be applied at each joint to prevent leakage.
 - ii. Manhole steps shall conform to ASTM C 478. Manholes shall be furnished with steps placed a maximum 16 inches apart with the first step placed no greater than 2 feet below the top of the frame.
 - iii. Joint seal system for the setting of a manhole casting shall be Infi-Shield Uniband or equivalent. The manufactured joint seal shall be made of a high quality EPDM rubber with a minimum thickness of 60 mils that meets or exceeds ASTM C 923. The joint shall have 2-inch wide mastic strips on the top and bottom of the roll. The mastic shall be non hardening butylrubber sealant that meets or exceeds ASTM 0990-94. The seal shall be designed to prevent leakage of water into the manhole.
 - iv. Precast concrete adjustment rings or rubber riser rings equivalent to Infra-Riser Multi Purpose Rubber Adjustment Risers may be used to adjust casting height. The adjusting rings shall not exceed a total height of 12-inches. Non-hardening butyl rubber sealant shall be installed between cone, riser rings and casting. Sealant shall meet or exceed ASTM 0990-94. The rubber adjustment rings are not to be used under roadways.
 - v. All pipe connections to the manhole shall be contour sealed on the interior of the manhole using Preco sealer or equivalent.
 - vi. Manhole covers shall be Type "A" cast iron ring and cover to conform to ASTM A 48. All sanitary manholes that lay in or along a stream, swale, or open storm channel shall have locking or bolt down lids with an inside seal between the lid and casting. Manholes lids shall be stamped "CITY OF GREENFIELD, SANITARY." Casting shall be East Jordan Ironworks 1022 Gasketed Casting and 1020 Lid, or equal.
 - vii. Manholes shall be located within 10 feet of the curblineline to facilitate future maintenance unless an alternate location is approved by the Wastewater Utility Superintendent.
- d. JOINTS
- Gasket joints shall be used for PVC and Truss pipe. The gaskets shall be installed in accordance with ASTM C-425, latest revision.
- e. BEDDING MATERIAL
- i. Bedding for the mainline sewers shall be No. 8 crushed stone.
 - ii. Bedding for building laterals shall be either No. 8 crushed stone or #24 sand.
- f. GREASE SEPARATORS

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- i. A minimum 1,000 gallon outdoor grease interceptor will be required for all Retail Centers and Community Kitchens with food preparation facilities.

3. EXECUTION

a. BONDS, LOCATES AND PERMITS

- i. The Contractor shall furnish all bonds necessary to get permits from the City of Greenfield prior to starting construction.
- ii. It shall be the responsibility of the Contractor to determine the location of existing utilities 24 hours prior to any construction or excavating. The Contractor will be further responsible for maintaining operation of the active utilities. The Engineer will not be responsible for any damage caused by an erroneous location shown or by the omission of a utility location on the plans.
- iii. A Wasteload Allocation Permit must be received through the City Engineer's Office prior to the start of sewer construction.
- iv. The Developer shall be responsible for all approvals, permits, and easements. The Developer shall dedicate all sanitary sewers and easements containing sanitary sewers.

b. PRE-CONSTRUCTION CONFERENCE

Prior to the beginning of any construction on the project site, a pre-construction conference will be scheduled with the City.

c. GENERAL REQUIREMENTS

- i. The current City of Greenfield Sanitary Sewer Standard Specification shall prevail as to materials and methods of construction.
- ii. All future sewer installation, either connected to or extended from this system shall be constructed in accordance with these specifications.
- iii. All lots shall be served by a 6-inch diameter sanitary sewer, as a minimum.
- iv. Roof drains, footing drains and/or surface water drains shall not be connected to the sanitary sewer system, including temporary connections during construction.

d. EROSION CONTROL

The Contractor shall be responsible for temporary erosion control measures during construction (i.e., straw bales around storm inlets and swales that exit the site). Where required, the Contractor shall be responsible for obtaining a Storm Water NPDES permit for the project.

e. TRENCH SAFETY AND CONFINED SPACE ENTRY

The Contractor is responsible for safety at the job site. Compliance with all State and Federal safety regulation, including but not limited to construction trench safety and confined safety entry regulations, shall be the responsibility of the Contractor.

f. SEPERATION DISTANCES

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- i. Sewers and water mains shall be laid with at least a 10-foot horizontal separation. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10-foot separation, deviation may be allowed on a case-by-case basis. Such deviation may allow installations of sewers and water mains closer provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18-inches above the top of the sewer.
- ii. For crossings of water main and sewers, a minimum 18-inch vertical separation between the two pipes shall be provided as measured from the outside of the sewer to the outside of the water main. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.
- iii. Where it is impossible to obtain proper horizontal or vertical separation, as indicated above, both the water main and sewer shall be constructed of ductile iron pipe with mechanical joints complying with public water supply design standards and be pressure tested to 150 psi to assure water tightness before backfilling.
- iv. Other Separations:
Full-depth granular backfill required for any sanitary sewer crossing a storm sewer.
All sewers shall be a minimum 10 feet horizontally from all ditches, creeks, and ponds.

h. TRENCHING, BEDDING AND BACKFILL

- i. The minimum trench width shall be 1.25 times the pipe outside diameter plus 12 inches. Minimum depth of cover for mainline sewers shall be 54 inches.
- ii. Bedding, haunching, initial backfill and final backfill for laterals shall be #24 sand or #8 crushed stone. Bedding for laterals shall be at least 4 inches deep. Initial backfill shall be at least 6 inches in depth above the top of pipe.
- iii. Bedding, haunching and initial backfill for flexible (PVC) pipe for mainline sewers shall be #8 crushed stone. The minimum depths shall be as follows:

| Pipe Size, Inches | Depth Below Barrel, Inches | Depth Above Top of Pipe, Inches |
|-------------------|----------------------------|---------------------------------|
| 6 or less | 4 | 6 |
| 8 to 15 | 4 | 12 |
| 18 and larger | 8 | 12 |

- iv. Bedding, haunching and initial backfill for semi-rigid (Ductile Iron) pipe for mainline sewers shall be #8 crushed stone. The minimum depths shall be as follows:

| Pipe Size, Inches | Depth Below Barrel, Inches | Depth Above Top of Pipe, Inches |
|-------------------|----------------------------|---------------------------------|
| 8 to 15 | 4 | 6 |
| 18 and larger | 8 | 6 |

- iv. Outside five (5) feet of the edge of pavement or back of curb or sidewalk mainline sewers shall be backfilled with clean fill material free of rocks larger than six (6) inches in diameter, frozen lumps of soil, wood or other extraneous material. Backfill shall be placed in 1-foot layers and mechanically tamped.
- v. Within 5 foot of edge of pavement, or back of curb or sidewalk mainline sewers shall be full-depth backfilled with # 8 crushed limestone, #53 crushed limestone or #24 sand.

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- vi. Fills placed under any street or sidewalk or within the building pad areas shall be compacted to 95% maximum density as determined by procedures outlined in ASTM D 1557.

i. SANITARY SEWER CONSTRUCTION

- i. The mainline sewer shall be constructed at the following minimum grades:

| | |
|---------|--------|
| 8-inch | 0.40 % |
| 10-inch | 0.28 % |
| 12-inch | 0.22 % |
| 15-inch | 0.15 % |
| 18-inch | 0.12 % |
| 21-inch | 0.10 % |
| 24-inch | 0.08 % |

- ii. Lateral sewers shall be laid at a minimum slope of 1/4 inch per foot, unless otherwise approved by the City. Lateral connections to the mainline sewer shall be by wye or tee connections. Minimum of 12" between lateral taps. No saddle connections will be allowed. No lateral shall directly discharge to a manhole unless approved by the City. A 2" "S" shall be stamped on the curb at each lateral location.

j. MANHOLE CONSTRUCTION

- i. The maximum distance between manholes shall be 400 feet. Manholes shall be placed where pipe align, slope, material and/or size change.
- ii. Connections to all manholes (new or existing) shall be core drilled and booted. These taps shall be cored into the manhole between the spring line of the sewer or no more than 24 inches above the flow line. Manhole connections shall not protrude past the interior of the wall of the manhole, unless directed by the Wastewater Utility Superintendent.
- iii. The flow channel through manholes shall be U-shaped at a minimum width equal to the diameter of the pipe extending between the pipe invert. The benchwall shall have a slick finish.
- iv. Joint seal system shall be installed per the manufacturer's written instructions. The top of the manhole casting and cone section shall be joint sealed with inspection prior to backfilling.
- v. Manholes shall be marked and protected with 2 green metal sign posts, one on each side, to mark and protect the manhole during construction.
- vi. Manholes shall be placed on a minimum 6 inches of No. 2 crushed stone that has been mechanically compacted. Where unstable or poor soil conditions exist, additional No. 2 crushed stone or Class B concrete shall be placed to form a stable base. The remainder of the manhole shall be backfilled using No. 53 stone. Stone shall be placed in 12-inch lifts and mechanically compacted to 95 percent maximum dry density per ASTM D 698.

k. TESTING

- i. Notify Wastewater Utility 48 hours in advance of any sewer test.
- ii. All sanitary sewers shall be tested for water tightness. The air test shall as a minimum, conform to the test procedure described in ASTM C 828. These tests shall be observed

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and certified by a representative of the City Engineer or Wastewater Utility Superintendent.

- iii. Deflection tests shall be performed on all PVC or other flexible pipe. The line shall pass a 5 percent mandrel deflection test conducted a minimum of 30 days after sewer installation. If the deflection test is to be ran using a rigid ball or mandrel, the ball or mandrel shall have a diameter equal to 95% of the inside diameter of the pipe being tested. The test shall be performed without the use of a mechanical pulling device. It shall be the responsibility of the Contractor to provide all the material, equipment and personnel to complete the testing. The deflection test must be observed and certified by a representative of the City Engineer or Wastewater Utility Superintendent after passing the deflection test using a certified proving ring.
- iv. The Contractor shall have the sanitary sewer video taped following installation. The videotape shall include information on the line location, manhole identification, line length and size. One copy of the videotape shall be provided to the City. Digital formatted videos are preferred.

l. RECORD DRAWINGS

- i. The Developer shall provide the City of Greenfield with record drawings for all sanitary sewers with services.
- ii. The Contractor shall provide the City of Greenfield with all internal "As-Built" locations upon completion of the sanitary sewer installation and prior to air and mandrel testing of the sewer.

m. SITE RESTORATION

- i. All areas disturbed by any construction, on and off site, shall be restored to its original condition. Excess construction material shall be removed from the project area as directed by the Developer at the Contractor's expense.
- ii. All disturbed areas shall be seeded. All City easements shall be seeded and straw covered. Netting may be required depending upon construction location.

C. UTILITY REGULATIONS FOR SEWER LATERAL HOOK-ONS

1. The Builder or Contractor must obtain both the water and sewer permits at one time, assuming that both types of service are required.
2. All permits issued must have the appropriate street address and/or lot number, as well as the Builder's name. If the Builder has not yet been determined, then the Owner's name must appear on the permit.
3. Under NO CONDITIONS shall any sewer laterals be backfilled until the City Engineer or Wastewater Utility Superintendent, or his appointed representative has inspected all work.
4. Sewer tape, minimum of 2 (two) inch wide metal, plastic coated shall be buried 12 – 18 inches below ground level when backfilling.
5. Lateral stubs shall be marked with a green metal sign post and shall extend beyond the easement line and be driven no deeper than 6 feet when a basement is not planned.

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6. All sewer lines shall be the size specified in the sewer ordinance (Code of Ordinances: Title V – Public Works; Chapter 51 – Sewers); i.e., 6 inch minimum for a single family dwelling and the proper size for apartments, commercial or industrial installations to be determined in the referenced code for each individual situation.
7. All laterals shall be PVC push on gasketed pipe and the material specifications shall comply with ASTM-3034 (SDR-35). No vitrified clay or glue joint pipe will be accepted.
8. No tapping of a sewer shall be made on the City sewers unless an approved saddle is used, as required by the City Sewer Department. PVC pipe shall not be saddled, unless approved.
9. The minimum slope of the pipe from the dwelling to the connection shall be 1/4 (one quarter) inch per foot or 2.00 percent.
10. No 90 degree bends are allowed in the lateral.
11. All clean outs shall be 6 (six) inch capped pipe.
12. No sewer hook ups shall be made on any City sewer unless the Owner/Contractor/Builder has the following in his/her possession:
 - _____ A VALID Building Permit.
 - _____ A Sewer Lateral Hook On Permit.
 - _____ A Street-Cut Permit (if applicable).
13. All lateral taps into an existing PVC sewer main must be made with an “inserta-Tee” or with a T-wye and slip-joint repair coupling. No Fernco couplings are permitted.

(Ord. 1979-24, passed 12-13-79)

408 WATER DISTRIBUTION SYSTEM

1. The plans for the installation of a Public water main supply system shall be provided by the petitioner and approved by the Greenfield Board of Public Works and Safety. Upon the completion of the water supply installation and one week prior to acceptance, the plans for such system’s as-built drawings shall be filed with the Plan Commission staff and Water Utility.
2. The purpose of these Water Distribution System Construction Standard Specifications is to ensure quality workmanship, adequate pressure and fire protection, and last but not least, to guarantee the residential, commercial, and industrial customers of the Greenfield Water Utility clean and safe water.
3. Failure to abide by these Specifications and or City of Greenfield Ordinance will result in the immediate suspension of any waterline construction activities.
 - a. A full-time Water Utility Inspector may be required for work to resume.
 - b. See section 52.16 of the Water Utility Ordinances.
4. PUBLIC WATER SYSTEM SPECIFICATIONS

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a. GENERAL

i. SCOPE

1. WATER DISTRIBUTION SYSTEM STANDARD SPECIFICATIONS - The City of Greenfield Water Utility (Public Water System Identification Number 5230004) has established the following Specifications for contractors to follow when installing water lines in the City of Greenfield.
2. The petitioner shall provide the subdivision with a complete public water distribution system, including fire hydrants at appropriate locations that shall be connected to the municipal water distribution system and approved by the Greenfield Board of Public Works and Safety.

b. DEFINITIONS

i. The following definitions/ abbreviations shall apply

1. ASTM- American Society for Testing and Materials, Latest Edition
2. City- City of Greenfield
3. Engineer- City of Greenfield Engineer
4. INDOT- Indiana Department of Transportation
5. IDEM- Indiana Department of Environmental Management
6. NOI- Notification of Intent to Construct a Water Main Extension
7. Utility- City of Greenfield Municipal Water Utility
8. Waterlines- Any pipe that carries potable water from the public water main to the meter.

5. SUMMARY OF STANDARDS SECTION

- A. Submittals
- B. Products for Potable Water distribution system
- C. Execution of the Installation of Potable Water System pipes
- D. Installation of all required and restraint couplings.
- E. Flushing, cleansing, and disinfecting of Piping System.
- F. Pressure Testing of Piping System.
- G. Bacteria Testing of Piping System
- H. Back-Flow Preventers Requirements
- I. Utility Regulations for Water Service Connections
- J. Requirements for Existing Water system testing
- K. Charges Established.

6. STANDARDS SECTION

A. SUBMITTALS

1. Along with the City of Greenfield Specifications, any contractor installing waterlines must submit a construction permit or NOI application to the Drinking Water Branch of the Indiana Department of Environmental Management.

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- a. No construction will be allowed without first obtaining a NOI, or permit (if required), approval from IDEM.
- b. The City of Greenfield Water Utility must sign this application for approval before it will be accepted by IDEM.
- c. The Water Systems capacity information will be provide to the applicant at technical review meeting. This information and subsequent calculations must be submitted to the Greenfield Water Utility prior to the project being approved to be constructed.
- d. When submitting this application to the Water Utility, a set of Final Approved construction plans must be included.
- e. These plans, along with the application, must be stamped and signed by a State of Indiana Registered Professional Engineer.
- f. Applicants whom are submitting plot plans for approval for the construction of a building on a lot within the City of Greenfield, shall be reviewed for compliance with the current City Water Main Standard Specifications.
 - i. The City of Greenfield and or the Greenfield Water Utility shall not be held liable for any infrastructure changes that may or may not be required to accommodate the construction on a lot within the Limits City of Greenfield.
 - ii. Product data sheets must be submitted on all Contractor supplied materials including pipe, valve boxes, valves, mechanical joints, fittings, tees, and all other miscellaneous products proposed for use.
 - iii. All material used in the construction of waterlines and mains in the Greenfield Municipal Service Territory must be Domestic made and purchased unless otherwise approved.

2. PROJECT RECORD DOCUMENTS

- a. Record drawings shall be supplied to the City within 90 days of the completion, testing, and acceptance of installed water system.
- b. The record drawings shall be submitted as hard copy and digital copy, as well as ARCGIS drawing file or format approved by Greenfield GIS Coordinator.
- c. The ARCGIS drawing file and hard copy will identify all locations of installed piping, valves, fittings, hydrants, and service lines from known reference points.
- d. The final record documents will clearly state if the subdivision will have private infrastructure if applicable.

3. QUALITY ASSURANCE

- a. CODES AND STANDARDS
 - i. Comply with all Current City of Greenfield Water Ordinances.

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- ii. Comply with these standards as addition to City of Greenfield Water Ordinances.
 - iii. Comply with "American Water Works Association" (AWWA) standards to extent indicated by references herein. All references shall imply the latest revision.
 - iv. Comply with "Recommended Standards for Water Works" (Ten States Standards) to extent indicated by references herein. All references shall imply the latest revision.
 - v. Comply with requirements of the City of Greenfield Engineering Department for work along property lines, on public property, and utility easements.
- b. Installer's Qualifications:
- i. Contractor shall have a minimum of three years of verifiable experience installing water distribution systems of type required.
 - 1. This three years of water installation projects must be submitted prior to the primary Technical Review Committee Meeting.
 - ii. This experience, as expressed in previous projects, shall be submitted by the Contractor at least two weeks prior to the primary Technical Review Committee Meeting for the application being considered for approval for construction.

4. PROJECT CONDITIONS

- a. In the event that any unknown or unmarked active utilities be broken during excavation work, stop work immediately. Do not proceed further with work until decision has been reached regarding repair, disposition, or relocation of utilities. Notice must be made to the Greenfield Water Utility.
 - i. The City of Greenfield Engineer, Project Manager, and or the Water Utility Manager or their designee will make any determination of impact utilities.
 - ii. Storm water field tiles must be repaired, rerouted, or connected to a storm sewer system when encountered.
 - iii. Any drainage tiles, regardless of its apparent condition, that is damaged or severed during construction must be repaired.
 - iv. Examine areas and conditions under which water system's materials and products are to be installed.
 - 1. Do not proceed with work until satisfactory conditions are present.
 - 2. 48 hour notice and site inspection by the Water Utility must proceed any water line installation.

5. SEQUENCING AND SCHEDULING

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- a. Construction Sequence:
 - i. 48 hour notice must be given to the Water Utility prior to the start of any construction.
 - 1. Based on the City of Greenfield business schedule
 - ii. Contractor shall submit proposed detailed construction sequence for:
 - 1. Connection to active water mains by hot tap. No contractor shall initiate shutting down of active water mains unless said shut down has been coordinated with and at the direction of the Greenfield Water Utility.
 - 2. Proposed method of disinfecting of new system or main.
 - 3. Coordination with Greenfield Water Utility is defined as scheduling construction, inspection, valve actions, or any other city involved activity; must be done with at least two City of Greenfield business day notice.

6. ISOLATION OF NEW IMPROVEMENTS

- a. The new construction water main isolation valves shall remain closed until all testing has been completed and accepted by the Water Utility.
 - i. At no time shall any contractor open or close any water valve.

B. PRODUCTS

- 1. All products used in any and all water line or main installation will be domestic material only.
 - b. If any product to be used in the installation of water main is found to be non-domestically made or incorrectly installed, the developer will be required to remove the unapproved materials and re-install the correct approved materials.
- 2. WATER MAINS
 - a. Pipe shall be ductile iron manufactured in accordance with the requirements of ANSI/AWWA/WA C111/A21.1
 - b. DUCTILE PIPE
 - i. Class 52 and Class 350 pressure pipe.
 - ii. Pipe and fittings shall meet or exceed ANSI/AWWA C104/A21.4
 - c. SDR 11 HDPE
 - i. Pipe may be used for boring under highways, creeks, ditches, etc. as approved by the Water Manager or their representative on a stamped set of plans.

- ii. Ductile iron fittings must be used with HDPE pipe
 - 1. Harvey adaptors are required to transition from HDPE to Ductile Iron pipe.
 - iii. Contractors are required to pull back a minimum of two sets of tracer wires with any bored in main or line.
 - d. ACCEPTABLE MANUFACTURERS
 - i. Will be determined when material submittals are reviewed prior to the start of site construction.
3. CORPORATION STOP (TAP) – 3/4” – 1”-1 1/2”-2”
- a. Tap is to be easy turning, ball valve having a round, full-open, unobstructed flow way with AWWA taper threads (CCI) and CTS compression outlet.
4. FITTINGS
- a. Ductile-iron, cement lined AWWA C 104; and rubber-gasket joints, AWWA C111.
 - b. Fittings shall be ductile iron and in accordance with the requirements of either ANSI/AWWA C153/A21.53 or ANSVAWWA C110/A21.10.
 - c. Mechanical joints shall conform to ANSI/AWWA C111/A21.11.TAPS MADE ON WATER MAIN
 - i. New subdivision main installation shall be made by hot tap of existing city water mains.
 - ii. Single service taps shall be made by using a Stainless Steel Full Circle Clamp type tapping sleeve.
5. TAPPING VALVES
- a. AWWA C509 compatible with stainless steel tapping sleeve
 - i. 175 psi minimum working pressure.
 - ii. Iron body, resilient wedge, non-rising stem, O-ring type packing, and left hand open.
 - iii. 2" square operating nut, flanged inlet, and mechanical joint outlet connection.
 - iv. Acceptable manufacturer is Mueller or Kennedy.
6. GATE VALVES
- a. AWWA C509,
 - i. 175 psi minimum working pressure.
 - ii. Iron body, resilient wedge, non-rising stem, left hand open,

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- iii. 2" square operating nut, mechanical joint ends, O-ring packing.
- iv. Acceptable manufacturer is Mueller or Kennedy.

7. VALVE BOXES

- a. Two-piece screw type shaft,
 - ii. 5" minimum inside diameter
 - iii. Cast iron of 1/4" minimum thickness, flared base.
 - iv. Centering disk
 - v. Appropriate water labeled valve box lid

7. GLANDS, GASKETS, BOLTS, AND NUTS

- i. AWWA C111 MEGA LUG restraints shall be used on all mechanical joints.

8. FIRE HYDRANT ASSEMBLIES (Includes anchor tee, valve, valve box, adapter pipe, and hydrant)

- a. Assembly must be approved by the City.

i. TEE:

- 1. Mechanical joint with 6" branch line for anchoring and locking hydrant assembly in place
- 2. Include split gland.
- 3. 6" Valve and Valve Box: See Items 6 and 7 of this section

ii. ADAPTER PIPE

- 1. 6" diameter by 2'-0" long minimum for locking valve to hydrant.
- 2. Use anchor couplings when distance permits

iii. HYDRANT

- 1. AWWA C502, 5-1/4" valve opening with 6" barrel.
 - a. Two 2-1/2" nozzles, one 5" Storz Connection
 - b. Ground line breakable flange
 - c. Self-draining
 - d. Left Hand open

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- e. Stainless steel bolts threads and operating nut sizes conforming to municipality standard.
- f. Mueller Super Centurion, Kennedy K81 Guardian are accepted.

b. PIPE COUPLINGS

- i. Suitable for size and gap between pipes being coupled.

c. BACKFILL

- i. #8 stone is the only material to be placed around hydrant drain holes.
- ii. #8 stone must cover to a minimum of 18" above drain holes
- iii. #24 sand is the only backfill allowed for all pipe materials and sizes.

d. COLOR

- i. All hydrants will have the barrels painted safety yellow.

1. Public Hydrants

- a. The 2 1/2" hose caps will be painted the color of the size of the main the hydrant leg is attached.

2. Private hydrants

- a. The bonnets painted to match the 2 1/2" hose caps. These caps will be painted the color of the size of the main that the hydrant leg is attached.

ii. Color reference by main size:

- 1. 20" - Gold
- 2. 16" – Orange
- 3. 12" – Yellow
- 4. 10" – Black
- 5. 8" – Green
- 6. 6" – Red

8. BUILDING WATER SERVICE LINES

a. PIPE MATERIAL

- i. Type K soft copper required from tap and tapping saddle to stub out.

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- ii. Water service lines will be installed perpendicular from the water main to the location of the water service meter pit.
- iii. There will be one water service line for each lot sized appropriately for the building to be served by the Municipal Water System.
- iv. No other connection will be made inside the City meter pit.

b. CUSTOMER METER PITS

- i. 5/8" Standard Meter Pit- Residential standard
 - 1. 18"x 36" polyethylene pit body.
 - 2. The meter pit cover shall be an 18" Ford ring and lid, pierced for a radio read antennae. Lids to have recessed centers.
 - 3. Packed #24 sand shall serve as the pit base.
- ii. 1" Standard Meter Pit- As Approved
 - 1. 24"x36" to 48" polyethylene pit body
 - 2. The meter pit cover shall be a 24"x18" expansion ring with a pierced 18" Ford ring and recessed center lid.
 - 3. Packed #24 sand shall serve as the pit base.
- iii. 1.5" or 2" services
 - 1. Require a 2" tap with 2" gate valve and 5 ¼" valve box
 - 2. 1.5" or 2" curb stops shall not be permitted.

c. INDOOR WATER METERS

- i. 1" or larger, along with the check valve assemblies, shall be placed indoors in the manner approved by Water Utility Distribution Foreman or appointed representative.
- ii. A meter set drawing is available at the Water Utility for 1" and larger interior meter setting.
- iii. Interior meter settings will be made in accordance with AWWA Standard M33 current edition.

b. RECORD DRAWINGS

- i. The Developer shall provide the City with record drawings for all water mains with services, in accordance with Section B(a)(iii)(5) of the current water standard specifications
- ii. The Contractor shall provide the City with all internal "As-Built" locations upon completion of the water main installation and prior to pressure testing of the main.

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- iii. Submission to include shape file drawing for GIS update as per City GIS Coordinator.

c. SITE RESTORATION

- i. All areas disturbed by any construction on and off site, shall be restored to its original condition.
- ii. Excess construction material shall be removed from the project area as directed by the Developer at the Contractor's expense.
- iii. All disturbed area shall be seeded.
- iv. All City easements shall be seeded and straw covered.
- v. Netting may be required depending upon construction location.

C. EXECUTION OF THE INSTALLATION OF POTABLE WATER SYSTEM PIPES

1. BONDS, LOCATES, AND PERMITS

- a. The contractor shall furnish all bonds necessary to get permits from the City prior to starting construction.
- b. It shall be the responsibility of the Contractor to determine the location of existing utilities by calling IN811 48 hours prior to any excavating.
- c. The Contractor will be further responsible for maintaining operation of the active utilities.
 - i. The Contractor and or developer will be responsible for any modification of any installed Water infrastructure.
 - ii. The Contractor and or developer will be responsible for the due diligence to survey and plan any require infrastructure modifications or replacements.
- d. The Engineer will not be responsible for any damages caused by erroneous location shown or by the omission of a utility location on the plans. An IDEM approved application must be on file with the utility prior to the start of water main systems.
- e. The Developer shall be responsible for all approvals, permits, and easements.
- f. The Developer shall dedicate all water mains and easements containing public water mains to the City.

2. PRE-CONSTRUCTION CONFERENCE

- a. Prior to the beginning of any construction on the project site, a pre-construction conference will be scheduled with the City.

3. GENERAL REQUIREMENTS

- a. The current City Water Standard Specification shall prevail as to materials and methods of construction.

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- i. All future water main installation, either connected to or extended from this system shall be constructed in accordance with these specifications.
- ii. All lots shall be served by a 3/4-inch water service line, as a minimum.
- iii. Irrigation systems shall not be connected inside the City meter pit.
 1. Separate meter setting is required.
 2. Irrigation services shall be a separate water main tap and setting.

4. EROSION CONTROL

- a. The contractor shall be responsible for temporary erosion control measures during construction (i.e., straw bales around storm inlets and swales that exit the site). Where required, the Contractor shall be responsible for obtaining a Storm Water NPDES permit for the project. All erosion measure shall be made in accordance with current City Storm Water Standard Specifications.

5. SAFETY

- a. The Contractor is required to adhere to City of Greenfield Safety Policies, regulations, and requirements at all times.
- b. Failure to comply with any safety requirement will result in a stop of all work on the site until the safety deficiency is corrected.
- c. No animals, children, non-essential employees on city property. Only the individuals completing the task assigned.
- d. Contractors are to follow all OSHA State, Federal and Greenfield guidelines (always adhering to the more stringent regulation).
- e. Contractors are to check in with the department Manager or PM when starting a project.

6. TRENCH SAFETY AND CONFINED SPACE ENTRY

- a. The contractor is responsible for safety at the job site. Compliance with all City of Greenfield, State, and Federal safety regulation, including but not limited to construction trench safety and confined space entry regulations, shall be the responsibility of the Contractor.

7. SEPERATION DISTANCES

- a. Sewer (to include Storm Water sewer) and water mains shall be laid with at least a 10-foot horizontal separation. The distance shall be edge to edge. In cases where it is not practical to maintain a 10-foot separation, deviation may be allowed on a case-by-case basis. Such deviation may

allow installations of sewers and water mains closer provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18-inches above the top of the sewer.

- b. For crossings of water main and sewers, a minimum 18-inch vertical separation between the two pipes shall be provided as measured from the outside of the sewer to the outside of the water main. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.
- c. Where it is impossible to obtain proper horizontal or vertical separation, as indicated above, both the water main and sewer shall be constructed of ductile iron pipe with mechanical joints complying with the current City Water Main Standard Specification and be pressure tested to 150 PSI to assure water tightness before backfilling

D. INSTALLATION OF ALL REQUIRED MAIN, HYDRANTS, SERVICE LINES, AND RESTRAINT COUPLINGS.

1. EXCAVATION

- a. Perform excavating work through whatever materials are encountered (including rock), in obtaining indicated elevations.
- b. Perform removals of any obstructions to obtain this condition at no cost to Owner.
- c. Use shoring to support trench walls as required per OSHA Standards.
- d. Remove excess and unsatisfactory excavated materials from site and dispose of in a legal manner.
- e. Stockpile satisfactory excavated material at distance from banks of trenches sufficient to avoid overloading and cave-ins, but in no case closer than 1/2 depth of excavation.
- f. Provide adequate drainage around stockpiled material, shunting surface water away from open trenches.

2. PIPING INSTALLATION

- a. All water main to be installed in the City of Greenfield shall be designed and installed to create loops and prevent the addition of non-connected mains in any water main system.
 - i. If a non-connected section must built due to limitations beyond the control of the petitioner a blow off hydrant and valve will be installed to allow future expansion without taking customers out of service. See subsection 5.
- b. Pipe for water mains shall be a minimum of 6-inch diameter or larger as indicated for the particular project for areas that require fire protection in accordance with Ten States Standards.

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- c. Inspect pipe before installation for apparent defects. Mark individual defective materials with white paint and promptly remove from site.
- d. Pipe stored onsite will be stored in such a manner to prevent infiltration of dirt and untreated water from entering the pipe.
- e. The pipes will be covered with an impermeable cover that is securely attached to the pipe.
- f. Valves for Water Mains, "T"s", Hydrants, etc. shall be clustered as close as practical to facilitate ease of operation and locating in future required maintenance.
 - i. Valves must be placed at all points on tees and crosses.
 - ii. Distances must not exceed 600 feet between valves.
- g. Install system in accordance with AWWA C600 "Standard for Installation of Ductile-Iron Water Mains, C900, DR14 and HDPE Pipe Water Mains and Their Appurtenances."
 - i. All codes and standards shall meet or exceed state regulations 327 IAC 8-3.2 Technical Standards for Water Mains.
 - ii. A copy of this standard shall be maintained at project site for reference.
- h. HDPE water mains shall be installed with minimum of two #10 tracer wire.
 - i. Tracer wire shall be fastened to the main at intervals not to exceed 10 ft. and shall be positioned at the top or 12 o'clock position of the pipe.
 - ii. Tracer Wire may be spliced by using a sealed DryConn connector.
 - iii. The wire's coating must be stripped at these connections to ensure electrical continuity to facilitate future utility locating requirements.
 - iv. Water main "T" junctions shall also be connected at these locations to facilitate the same.
 - v. Tracer wires for hydrants shall be exposed, stripped and fastened to the upper most flange bolts above ground level.
- i. In placing pipe, jointing, bleeding, backfill and embankment construction, exercise care to see that the pipe is not damaged during unloading or placement on bed.
- j. During compacting of backfill, by movement of heavy equipment over fill, or by any other forces that may cause damage.
- k. Remove and replace any pipe which is not in true alignment and grade, or which shows undue settlement after laying or is otherwise damaged.
- l. Install piping only by laying sections of pipe up slope
 - i. Install spigot ends into previously laid bell ends.

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- ii. Install piping with uniform bearing along its length.
 - iii. Pipe deflection will not be accepted.
 - iv. Pipe ends must be protected by placing a protective cover over the pipe at the end of each work day.
- m. Backfill under pipe 6" with #24 sand. Extend up around and 24" over the pipe. Above this level use one of the following methods:
 - i. In lawn areas, use clean earth backfill and place 6" lifts and compact to 90% maximum density (at optimum moisture content) as determined by Modified Proctor Tests. ASTM D 1557.
 - ii. In paved areas backfill, compact, and fill with concrete per applicable standards
 - 1. City Street Principles and Standards of Design
 - 2. Current INDOT Standards and Specifications
 - 3. Full depth granular material and #24 sand must be used within 5 feet of all pavement areas and under sidewalks.
 - 4. Cut off sheeting at 2'-0" below finish grade when backfilling reaches that approximate level.
 - 5. Curbs shall be marked with "W" where the service line crosses onto lot from the water main.
 - 6. The water service line shall be installed perpendicular from the water main to the water meter pit.
- n. Water for testing, filling and flushing shall be from approved source available from the City without charge.
- o. Unless otherwise approved the Contractor will not permit the use of hydrants, or other water sources for construction activity without the expressed written permission of the Water Utility.
- p. Pipe shall be a minimum of 8" Ductile Iron Pipe (DIP) for the main public roads of a new subdivision.
- q. Pipe shall be a minimum of 6" DIP for a subdivision cul-de-sac following the curve of the road ending with a 5' bury height hydrant as per these standards.
- r. 54 inch minimum cover shall be maintained for new work except as required to transition to meet existing water line elevations.
 - i. Not more than 30 feet of trench shall be dug in advance of completed pipe laying excavation.
 - ii. Blocking as specified in AWWA C600 Section 8 shall not be provided except concrete blocks shall be used.

- iii. Concrete shall not be poured on any water line.
- iv. Mega-lug restraint collars shall be used.
- v. Restraint collars 2 joints on each side of a 90 degree change in direction and one joint on each 45, 22.5, 11.25 degree change in direction.
- s. Stock pilings of granular materials must be surrounded by approved erosion control material such as coconut logs or approved equal.
- t. AWWA C600 Section 11.4 shall not apply, and Section 11.5 shall not apply unless indicated otherwise.
- u. Anchorage for hydrants shall be through anchorage fittings as specified. No other means are acceptable.
- v. Fire Hydrants will be used as the only means for dead end blow off.
 - i. Upon extension of the water main, the blow off fire hydrant will be returned to the Water Utility.
 - ii. Fire Hydrants shall be placed no more than 400 feet from one hydrant to the next.

3. SITE RESTORATION

- a. All areas disturbed by any construction on and off site, shall be restored to near its original condition
- b. Excess construction materials shall be removed from the project area as outlined in construction plans.
- c. All disturbed area shall be seeded in the best method required to prevent erosion.
- d. All City easements shall be seeded and covered.
- e. Lawn netting may be required depending upon construction location.

E. CLEANING AND DISINFECTION WATER DISTRIBUTION PIPING REQUIREMENTS

a. CLEANING OF WATER MAINS

- i. Notify the Utility representative at least 2 working days prior to the commencement of cleaning and disinfecting activities.
- ii. Water for testing, filling, and flushing shall be from approved source available from the City without charge.
- iii. Contractor shall not permit the use of hydrants or other water sources for construction activity without the expressed written permission of the Water Utility Manager or their designee.
- iv. Contractor shall purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired, prior to use.

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- v. Use the purging and disinfecting procedure proscribed by the City jurisdiction or, in case a method is not proscribed by that authority, use the procedure described in AWWA C65 1, or as described below.
- vi. Comply with NFPA 24 for flushing of piping, flush the piping system with clean, potable water until discolored water does not appear at the points of outlet.
- vii. Fill the system or part thereof with a water/chlorine solution or place granular chlorine as main is installed to achieve 50 parts per million chlorine residual.
 - 1. City of Greenfield Water Utility personnel will Isolate (valve off) the system or part thereof and allow to stand for 24 hours.
 - 2. Drain the system or part thereof of the previous solution
 - a. When the main is to be drained containing high strength chlorine, the chlorinated water must be de-chlorinated prior to any discharge to storm or sanitary sewer system, or open ground.
 - b. Following the allowed standing time, flush the system with clean, potable water until chlorine levels above 1.5 ppm does not remain in the water coming from the system.
 - c. When the main is to be drained containing high strength chlorine, the chlorinated water must be de-chlorinated prior to any discharge to storm or sanitary sewer system, or open ground.

b. SHUTDOWN OF ACTIVE WATER MAINS

- i. "Hot Taps" are the preferred method of extending or adding a section of water main to an existing main.
- ii. Only in extreme cases will the utility permit the isolation of an existing water main.
- iii. If in these extreme and rare cases, portions of existing water distribution system is required to be isolated to make new connections, minimum two (2) week advance notice shall be given to Utility.
- iv. These shutdowns shall be shown on the construction schedule.
- v. Times for shutdown shall be coordinated with and shall be at discretion of the Utility
- vi. Existing valves shall be operated only by Utility personnel.
- vii. New connections shall be made in such a manner that the water service is shut off to existing users for a maximum of 4 hours.
- viii. 48- Hour advance notice shall be given to affected water users that their water will be shut off after authorization from the Utility has been obtained.

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- ix. Contractors shall be responsible for the delivery of notices to those affected indicating date, time, and duration of shut down.
- x. Contractors must confirm with Utility those services that may be affected and then adhere to the times stated in notice.

F. PIPE TESTING

a. HYDROSTATIC TESTS

i. NOTIFICATION

1. The Contractor shall notify the Utility 2 working day prior to testing.

- a. A Utility representative shall be present for all testing.
- b. The Contractor shall provide all temporary bracing for testing operations.
- c. Refer to Water Utility Ordinances for charges involved with water main testing or when additional inspection services are required due to poor construction practices witnessed by Utility Employees.

d. TEST PROCEDURE

- i. Test at not less than 150 psi for 4 hours.
- ii. Maximum allowable loss 5 psi over 4 hours.
- iii. Remake leaking joints with new materials and repeat test until leakage is within above limits.
- iv. Prepare reports for all testing activities.

G. BACTERIA TESTING

- a. A Certified Greenfield Utility Water Operator shall be responsible to collect and submit the first three sets of water samples to the City of Greenfield's designated State approved Laboratory for testing. Sample collection will be scheduled at the discretion of the Water Utility.
 - i. A set of samples is defined as the collection of two specimens from each required location in the newly constructed water main.
 - ii. Should subsequent sets of samples be required, the contractor will be financially responsible for each additional set.
 - iii. At least one set of samples shall be collected from every 1,200 ft (366 m) of the new water main, plus one set from the end of the line and at least one set from each branch.
 - iv. Under no circumstance will any water line be accepted by the City until the Utility has received completed testing paperwork from the City of Greenfield's designated State Approved Laboratory stating the bacteriological testing is satisfactory.

H. CROSS CONNECTION AND BACKFLOW PREVENTION DEVICES

- a. Backflow preventers shall comply with AWWA standard C511.
- b. Double backflow assemblies shall comply with AWWA standard C510.
- c. In no case will any backflow preventer be housed in a vault or below ground.
- d. Backflow prevention devices shall be installed after the Public Water Utility Meter in all cases.
- e. No installation of public water supply piping or part thereof shall be made in such a manner that it will be possible for used, unclean, polluted or contaminated water, mixtures or substances to enter any portion of such piping from any tank, receptacle, equipment or plumbing fixture by reason of back siphonage or any other cause, either during normal use and operation thereof or when any such tank, receptacle, equipment or plumbing fixture is flooded or subject to pressure in excess of the pressure in the hot-or-cold-water piping;
- f. No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by any public or private water service system, and any pipes, conduits or fixtures containing or carrying water from any other source or containing or carrying water which has been used for any purpose whatsoever, or any piping carrying chemicals, liquids, gases, or any substance, unless there is provided an approved backflow prevention device.
 - i. IDEM's approval must be obtained before any connection is made between the domestic supply and any contaminated, polluted, or auxiliary water system; and,
- g. No plumbing fixture, device or construction shall be installed or maintained or shall be connected to any domestic water supply when such installation or connection may provide a possibility of polluting such water supply or may provide a cross connection between a distributing system of water for drinking and domestic purposes and water which may become contaminated by such plumbing fixture devices or construction unless there is provided an approved backflow prevention device.
- h. All connections from the public water supply to the temporary location will be made with:
 - i. No-lead connections wyes or valves
 - ii. Food grade water hose for the entire length from the first connection to the public water supply to the end consumer
 1. All food grade hoses will be set in such a manner to prevent any connection or portion of the hose to lay in standing water or come in contact with unsanitary conditions.
- i. **Consumer responsibility:**
 - i. The consumer has the primary responsibility of preventing pollutants and contaminants from entering their potable water system or the public potable water system. The consumer's responsibility starts at the point of delivery from the public water supply and includes all water conditioning equipment and piping. When it is determined that a backflow prevention device is

required for the protection of the public water system, the consumer shall be required to install an approved backflow prevention device at each service connection at their own expense, to properly repair and maintain the device or devices and to keep adequate records of each test and subsequent maintenance and repair.

j. **Unacceptable Backflow Preventer Devices**

i. *Single-Check Valve*

ii. *Changeover Devices*

k. **Acceptable Backflow Preventer Devices:**

i. *Air-Gap Separation*

1. Air-gap separation (AG) is probably the oldest method of preventing cross connections that result in backflow due to either back pressure or back siphonage. In many states, it is still the only method approved for preventing this type of backflow. Air-gap separation is the unobstructed vertical distance through free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture or other device and the flood-level rim of the receptacle.

ii. *Atmospheric Vacuum Breaker*

1. The atmospheric vacuum breaker (AVB) assembly is one of the most simple and least expensive types of backflow preventers. The AVB contains an air inlet valve, check seat and an air inlet port. Water flowing through the AVB causes the air inlet valve to close against the air inlet port. When normal water flow is stopped, the air inlet valve falls to form a block for back siphonage. The AVB protects against non-health hazards or health hazards under back siphonage only. The atmospheric vacuum breaker is not designed to protect against back pressure. Based on the design and operation of AVB, the following criteria must be implemented:

- a. Absolutely no shut-off valves are allowed on the discharge side of the AVB;
- b. A minimum of six inches of clearance above all downstream piping of the AVB or any overflow rim is required; and,
- c. The AVB shall not be under continuous pressure for more than 12 hours.

2. *Pressure Vacuum Breaker*

- a. The pressure vacuum breaker (PVB) assembly evolved from the need to have a testable atmospheric vacuum breaker. The PVB contains an internally loaded check valve and an internally loaded air inlet valve. The valves independently act with the air inlet valve located

downstream of the check valve. Shut-off valves and test cocks are located at each end of the assembly. The PVB, unlike the atmospheric vacuum breaker, can be tested. The PVB protects against non-health hazards or health hazards under back siphonage only. The pressure vacuum breaker is not designed to protect against back pressure. Based on the design and operation of PVB, the following criteria must be implemented:

- i. Shut-off valves may be installed on the downstream of PVB; and,
- ii. A minimum clearance of 12 inches above all downstream piping must be established.

3. ***Double-Check Valve***

- a. The double-check valve (DCV) consists of two independently acting, resilient seat check valves located between two tightly closing shut-off valves, together with suitable test cocks, and stop valves arranged so that the main check valves can be tested for water tightness.

4. ***Reduced-Pressure Principle Backflow Preventer***

- a. An approved Reduced-Pressure Principle device (RP) is regarded as an assembly that meets the requirements of the AWWA Standard for Reduced-Pressure Principle Backflow Prevention Assembly (AWWA C511-07) or an assembly that has been approved by a laboratory sanctioned by USC or Plumbing Code. The reduced-pressure principle backflow preventer, introduced to the water supply industry about 1942, is safer than the double-check valve. The device consists of an automatic differential-pressure valve located between two or more independently acting, spring-loaded, resilient seat-check valves. These seat-check valves are, in turn, located between two tightly closing shut-off valves.
 - i. Suitable test cocks are provided for testing the tightness of the main check valves. Since this device discharges to the atmosphere, it can be used where codes call for an air gap. Backflow assemblies installed in a confined space are not recommended. For example, the RP cannot be installed in pits.
 - ii. The RP operates on the hydraulic principle that water will not flow from a zone of lower pressure to a zone of higher pressure. As a differential-pressure valve, the relief valve is held in a closed position when the pressure on the supply side is higher by a prescribed amount than that in the zone between the two main check valves.
 - iii. When the pressure on the supply side of the unit falls below a set value, the relief valve opens, and

the intermediate zone discharges to atmosphere. If the pressure on the discharge side of the device becomes higher than the supply pressure and the second-check valve malfunctions, the intermediate zone also discharges to atmosphere. An outstanding advantage that the reduced-pressure principle backflow preventer has over the double-check valve is the visible indication of malfunctioning long before a danger of backflow exists. Hence, repairs can be made while the device is still effectively acting as a backflow preventer.

iii. **Examples of Cross connections and the Recommended Type of Backflow prevention**

| AG – Air Gap, AVB – Atmospheric Vacuum Breaker, DCV – Double Check Valve, PVB – Pressure Vacuum Breaker, RP – Reduced Pressure, SPVB – Spill Prevention Vacuum Breaker Fixture | Device |
|---|---------------|
| Automatic device for filling tanks, boilers and vats which have overflow connections to a sewer | AG/AVB |
| Automatic soap dispenser | AG/AVB |
| Any direct connection between water pipes and sewers, even though gate valves are used | RP |
| Any individual vat, tank, etc., which has an inverted water supply connection or a water supply connection below the top of the spill rim | RP |
| Coffee urn with direct water supply and sewer connections | AVB |
| Combination faucet with one safe and one unsafe supply | AVB |
| Commercial dishwashing machines | AVB |
| Dual water supplies, such as hot water supply from an unsafe source | AG/RP |
| Drinking fountain with submerged water inlet or with the water supply line passing through the drain | not allowed |
| Dual water supplies cross connected in factories, etc. | RP |

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| | |
|--|--------------|
| Filter with waste connected direct to sewer | AG |
| Frost-proof hydrant, whether or not the valve drains to the sewer or to the ground surrounding the sewer | AVB |
| Fire hydrant with drain connection to sewer or weep hole to the sewer or to the ground surrounding the sewer | RP |
| Garbage can washers | AVB/PVBA |
| Gas-type chlorinator with dual feed to mixing basin and clear well | AG/RP |
| Grease trap with water supply connection for flushing | AG |
| Hose for sink, laundry tray, soap kettles, etc. | AVB |
| Hose outlets for washing down industrial, commercial or other equipment | AVB |
| Industrial processes requiring direct water connections | RP |
| Industrial water supplies process appliances with direct water supply connections not having adequate air gaps | RP |
| Kitchen fixtures with common waste and supply lines | not allowed |
| Kitchen sink garbage disposal or grinder | AG/AVB |
| Lawn sprinkling systems | SPVB/PVB/DCV |
| Lawn sprinkling systems with automatic chemical dispenser | SPVB/PVB/RP |
| Make-up water tank at swimming pool with below-water inlet | AG |
| Pump used for dual purposes, with one safe and one unsafe supply | AG/RP |
| Pump used for unsafe material having a direct water connection for priming | AG/RP |
| Pump pit with drain connection to sump or sewer line | AG |

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| | |
|---|-------------|
| Rubber hose with hand control or self-closing faucets attached, as used in connection with baths, industrial vats, containers, etc. | AVB |
| Refrigeration equipment with water cooling | AG/RP |
| Rubber hose connection extending water line to below the overflow rim of sinks, lavatories, tanks, tubs, laboratory apparatus, etc. | AVB |
| Sealing ring on sewage pump with direct water connection | AG/RP |
| Sewage lift with direct water connection | AG/RP |
| Sinks with below-the-rim water inlets | Not allowed |
| Sludge line with direct water connection for flushing | AG/RP |
| Steam table with water supply connection entering the bottom of the table | AVB |
| Seat-action water closet with pressure tank having a flush valve in or attached to the bowl | AVB |
| Toilet equipped with flush-o-meter valve attached to the bowl | AVB |
| Tumbler washer in beverage sink having submerged inlet | AG/AVB |
| Tank with inverted supply or below-the-rim supply | AG |
| Water closet of the hopper type with pressure tank having a flush valve in or attached to the bowl | AVB |
| Yard hydrant having drip openings below ground surface that may allow polluted ground water to drain into the water supply pipes | RP |

iv. Available Sources to reference the above standards

1. **Indiana State Department of Health:**
 - a. 170 IAC 6-1-20 Water quality standards
2. **Rule 10. Cross Connections; Control; Operation (NOTE: IDEM Only Rules)**
 - a. 327 IAC 8-10- 2 Cross connection prohibited; bypass
 - i. Authority: IC 13-7-7-5; IC 13-7-14-5
 - ii. Affected: IC 13-7-7-5; IC 13-7-14-5
 - b. 327 IAC 8-10-3 Booster pump connection
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - c. 327 IAC 8-10-4 Cross connection hazards; notice; exemptions
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - d. 327 IAC 8-10-5 Secondary sources of supply; installation of air gaps or other devices
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - e. 327 IAC 8-10-6 Land irrigation facility buried below ground; installation of air gaps or other devices
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - f. 327 IAC 8-10-7 Construction and installation requirements for air gaps or other devices
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2; IC 22-13-2
 - g. 327 IAC 8-10-8 Inspection of devices; time limits
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
 - h. 327 IAC 8-10-9 Inspectors; reports of inspection or test
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-16-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2

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- i. 327 IAC 8-10-10 Noncompliance; retention of reports; access
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2
- j. 327 IAC 8-10-12 Approval of an organization as a training provider of cross connection control device inspectors; record keeping
 - i. Authority: IC 13-13-5-1; IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18
 - ii. Affected: IC 4-21.5; IC 13-11-2; IC 13-18-11-8
- k. 327 IAC 8-10-13 Incorporation by reference
 - i. Authority: IC 13-14-8; IC 13-14-9; IC 13-15-1-2; IC 13-15-2-1; IC 13-18-3-1; IC 13-18-4-1
 - ii. Affected: IC 13-11-2; IC 13-13-5-1; IC 13-18-2

I. UTILITY REGULATIONS FOR WATER SERVICE LINE CONNECTIONS

- a. The Builder or Contractor must obtain both the water and sewer permits at the same time, assuming that both types of permits are required.
- b. All permits issued must have the appropriate address and/or lot number. The Builder's name must also appear on the permit. If the builder has not been determined, then the Owner's name must appear on the permit.
 - i. If connecting to the Public Water System from a private well on an existing parcel the home/land owner will be required to provide a letter from a licensed plumber certifying that well has been disconnected from the customer owned service line.
- c. Type K soft copper to installed from main to water service pit.
 - i. Only Type K Copper tubing will be accepted in the meter pit.
 - ii. Copper tubing must start at the in-line stub out valve.
 - iii. The tubing must then turn up in the pit and connect to the yoke with a ball angle valve, leave the opposite side of the yoke from a ball angle valve, exit the meter pit and end with a CTS coupling about 3' from the meter pit toward the structure.
 - iv. The water line, pit base and 50% of the barrel must be backfilled with #24 sand after the first inspection.
 - v. Meter pit standard drawing must be used for installation as approved in current Greenfield City Water standards.
- d. #10 Tracer wire is required to be installed from the meter pit to the house. Must have excess wire in the meter pit to reach 2' above meter pit.

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- e. Under no conditions shall any water service lines be backfilled until a Representative of the Utility has inspected all work.
- f. The water service lines and water main taps to all lots shall be located in such a manner that the water service line to the meter pit is not located in the driveway pavement area.
 - i. If the water service lines are found to be in conflict with a proposed driveway or private sidewalk pavement area, the Contractor shall be required to relocate the service line.
 - ii. Water service line relocation shall be done so at the Builder's/Owner's/Developer's expense
- g. The meter pit should be located in such a manner to prevent vehicle traffic from causing damage to the installation.
- h. The Utility should be notified at least one week prior to the date the meter pit scheduled for completion.
- i. If water service lines are stubbed onto the property before construction of the building, it is the responsibility of the contractor to keep this line marked with a steel sign post during construction.
- j. The Water Utility will not install the meter unless the line meter pit has passed the final inspection. This is the responsibility of the builder.
- k. Business and/or commercial structure meters must be installed in a mechanical room or utility room approved by the Water Utility.
- l. The required backflow device must be installed after the meter.
- m. No water meter shall be installed by the Utility or Metering Department until a finish grade has been established.
- n. Once the meter pit has met the requirements of the Utility at the final inspection the new service would be approved for the meter installation.
- o. The 10-foot horizontal and 18-inch vertical separation rule must be maintained between water, storm, and sanitary sewer lines or mains.
- p. After the meter pit has been installed, it shall be the Builders/ Owners responsibility to maintain the integrity of said meter pit for a minimum of 3 years from the time of the meter installation.
- q. Any damages to the meter pit that requires the re-excavation by the Utility shall result in a service charge in the amount of \$2500.00
- r. No water service line construction shall be initiated until the Builder/Owner has the following in his/her possession:
 - i. A Valid Building Permit (if applicable)
 - ii. A Valid Water Service Permit
 - iii. A Valid Sewer Connection Permit (if applicable)
 - iv. A Street Cut Permit (if applicable)

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J. REGULATION OF EXISTING WATER SYSTEM TESTING

- a. This section applies to all existing and future commercial, industrial, or municipal entities that have a fire suppression loops or systems that are connected and or served by the Public Water System.
- b. The Builder or contractor that performs fire suppression loop or system testing within the City of Greenfield Water Service Territory shall be required to do the following:
 - i. Contact the Greenfield Water Utility via phone or email no less than 48 business hours prior to the planned system testing/maintenance event.
 1. The builder or contractor shall be required to provide:
 - a. The number of hydrants, fire pumps, booster pumps, valves, or any other water device or mechanism that will require water to be used for the testing or maintenance procedure; and
 - b. The duration of the test and or maintenance work
- c. Violation of this section will result in the assessment of a \$2,500 fee for each event

410 STORM DRAINAGE SYSTEM

- A. The petitioner shall provide the subdivision with a storm water drainage system designed for less than a ten-year storm period whenever the evidence available to the Plan Commission indicates that the natural surface drainage is inadequate. When the surface drainage is adequate, easements for such surface drainage shall be provided. Deep open ditches for drainage are not permitted in the street right-of-way. Where existing natural drainage ways offer a suitable means of storm drainage, the street right-of-way may be widened to accommodate them, or they may be located in a parkway or easement.
- C. The plans for the installation of a storm water drainage system shall be provided by the petitioner and approved by the Greenfield Board of Public Works and Safety. Upon the completion of the storm water system installation and one week prior to acceptance, the plans for such system as built shall be filed with the Plan Commission staff.

D. STORM SEWER STANDARD SPECIFICATIONS

1. GENERAL

a. SECTION INCLUDES

- i. Storm sewer drainage piping, fittings, accessories and bedding.
- ii. Catch basins, paved area drainage, and site surface drainage.

b. RELATED SECTIONS

- i. Section 02225 – Trenching.
- ii. Section 02607 – Manholes and Covers.
- iii. Section 03300 – Cast-in-Place Concrete.

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c. REFERENCES

- i. ANSI/ASTM D698 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixture, using 5.5 lb. (2.49 kg) Rammer and 12-inch (304.8 mm) drop.
- ii. ANSI/ASTM D1557 – Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb. (4.54 kg) Rammer and 18-inch drop.
- iii. ANSI D3017 – Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- iv. Indiana Department of Transportation (INDOT) Current Specifications.

d. DEFINITIONS

- i. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

e. SUBMITTALS

- i. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

f. PROJECT RECORD DOCUMENTS

- i. Submit as required by Engineer.
- ii. Accurately record actual locations of pipe runs, connections, manholes, catch basins, and invert elevations.
- iii. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

g. REGULATORY REQUIREMENTS

- i. Verify that field measurements and elevations are as indicated.

2. PRODUCTS

a. SEWER PIPE MATERIALS

- i. Reinforced Concrete Pipe: Concrete pipe shall conform to current ASTM Specifications C-14, C-76, and shall be of proper class and ASTM designation as shown on the plans and details.
- ii. PVC Pipe: PVC pipe shall conform to the requirements of ASTM C3033 or D3034, D1784, with an SDR of 35, and a compound designation class No. 12454 or as shown on the plans. PVC pipe shall meet AASHTO M304 with a 46 psi minimum rating.
- iii. ADS N-12 or Hi-Q pipe shall conform to AASHTO classification "Type D." Pipe and fitting shall be made with virgin Polyethylene compounds which conform with the requirements of cell class 324420C as defined and described in ASTM D3350.

b. JOINTS AND/OR COUPLINGS

- i. Reinforced Concrete Pipe Joints: Joints shall be flexible rubber-gaskets conforming in every respect, and in strict accordance with the current ASTM designation C-443. The

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method of coupling the pipe shall be in strict accordance with the gasket manufacturer's recommendations.

- ii. Poly Vinyl Chloride Pipe Joints: Poly vinyl chloride pipe joints shall be bell and spigot with elastomeric rubber gasket, as recommended and supplied by the pipe manufacturer.
- iii. Polyethylene pipe shall use a bell and spigot coupling meeting ASTM F477 specifications with an O-ring type gasket assembly.

c. CATCH BASINS

- i. Precast concrete catch basins shall conform to current ASSTM Specifications for reinforced concrete sewer pipe, and shall be of size, type and location as shown on the plans and details.
- ii. Iron castings shall conform to the current ASTM Specifications for gray iron castings, class 20 and shall be as shown on the plans and details. All castings shall be true to pattern in form and dimension: Free from faults, sponginess, cracks, blow holes and other defects. Bearing surfaces between cast frames, covering and grates shall be machine fitted together and match marked to prevent rocking.
- iii. All frames shall be placed in a 2-inch mortar bed and set to proper alignment and grade.
- iv. Catch basin steps shall be manufactured so as to resist corrosion, materials will be plastic coated steel. Steps shall have a minimum 10-inch tread width and shall project a minimum of 5 inches from the face of the wall. Steps shall be placed either at 12-inch intervals in a straight line and mortared in with a 1:2 cement mortar.
- v. A 1:2 cement mortar grout fillet shall be placed around the joint to seal the frame to the structure once the frame inside the catch basin has been properly set.
- vi. Precast concrete blocks shall conform to current ASTM Specifications C-139 for concrete manhole and catch basin blocks.
- vii. Base Pad: Cast-in-place concrete of type specified in Section 03300. Minimum thickness of 6 inches, leveled top surface or shall be a precast base and conform to ASTM Specifications C-76 and/or C-478.
- viii. Manhole lids must be stamped "City of Greenfield – Storm Sewer" East Jordan Ironworks 1020A Casting and 1020 Lid preferred.

d. BEDDING MATERIALS

- i. Bedding: As specified in the current addition of INDOT Standard Specifications.

3. EXECUTION

a. EXAMINATION

- i. Verify that excavation base is ready to receive work and excavations, dimensions and elevations are as indicated on drawings.

b. PREPARATION

- i. Hand trim excavations to required elevations. Correct over excavation with course aggregate.

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- ii. Remove large stones or other hard matter which could damage piping, or impede consistent backfilling or compaction.
- c. BEDDING
 - i. Excavate pipe trench in accordance with Section 02225 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.
 - ii. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth.
 - iii. Maintain optimum moisture content of bedding material to attain required compaction density.
- d. INSTALLATION – PIPE
 - i. Install pipe, fittings, and accessories in accordance with applicable standards for type of pipe used and manufacturer's instructions. Seal joints watertight.
 - ii. Place pipe on minimum 6-inch deep layer of bedding (PVC only).
 - iii. Lay pipe to slope gradients noted on drawings true to line starting at the outfall end of the sewer and laying the pipe with the bell end upgrade.
 - iv. The sections of the pipe shall be so laid and fitted together than, when completed, the sewer will have a smooth and uniform invert.
 - v. The pipe shall be kept thoroughly clean so that jointing compounds will adhere and after laying each pipe, the interior of the pipe shall be free from all dirt, cement, or superfluous material of every description so as to leave a clean, smooth, continuous flow line in the pipe.
 - vi. When crossing over a water or sanitary sewer main with a concrete storm sewer, an approved granular material shall be placed from the utility main to the spring line of the storm sewer.
 - vii. Install aggregate bedding by hand from bottom of trench to a horizontal plane
 - viii. passing through the center of the pipe with bedding material placed in layers of 3 inches and compacted by tamping.
 - ix. From a horizontal plane passing through the center of the pipe to a point 1-foot above the top of the pipe, the trench shall be backfilled with bedding material, placed in 6-inch layers and compacted to 95 percent of maximum dry density as determined by the Modified Proctor Method.
 - x. Refer to Section 02225 for trenching requirements. Do not displace or damage pipe when compacting.
 - xi. Refer to Section 02607 for manhole requirements.
- e. INSTALLATION – CATCH BASINS
 - i. Form bottom of excavation clean and smooth to correct elevation.
 - ii. Form and place cast-in-place or precast concrete base pad, with provisions for storm sewer pipe and sections.

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- iii. Level top surface of base pad to receive concrete shaft sections, sleeved to receive storm sewer pipe sections.
 - iv. Establish elevations and pipe inverts for inlets and outlets as indicated.
 - v. Mount lid and frame level in grout, secured to top cone section to elevation indicated.
- f. FIELD QUALITY CONTROL
- i. Field inspection and testing will be performed under provisions of Section 01410.
 - ii. Request inspection prior to and immediately after placing aggregate cover over pipe.
 - iii. Testing shall be considered a part of the Contractor's cost for backfill and compaction.
 - iv. Compaction testing will be performed by a certified testing laboratory and shall be to 95 percent dry density. See Section 02225 – Trenching for frequency and type of testing.
 - v. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.
- g. PROTECTION
- i. Protect finished work under provisions of Section 01500.
 - ii. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

(Ord. 1979-24, passed 12-13-79; Am. Ord. 1988-29, passed 12-8-86)

412 EROSION CONTROL

The intent of this ordinance is the control of soil erosion and sedimentation caused by land disturbing activities in the City. Measures taken to control erosion and sedimentation should assure that sediment is not transported from a site by storm events.

- A. This ordinance is adopted under the authority granted by Indiana Code §36-1-4-11, §36-7-4, and all acts supplemental and mandatory thereto. This authority provides for the administration, enforcement and amendment of this ordinance for controlling soil erosion in the City.
- 1. The City finds that soil erosion resulting from land disturbing activities caused a significant amount of sediment and other pollutants to be transported off-site to locations including ditches, streams, wetlands, lakes, and reservoirs.
 - 2. The purpose of this ordinance is to conserve the natural resources, to protect the quality of air and water, and to protect and promote the health, safety and welfare of people, to the extent practicable by minimizing the amount of sediment and other pollutants, resulting from soil erosion due to land disturbing activities, from being transported off-site to adjacent public or private lands including ditches, streams, lakes, wetlands, and reservoirs.
- B. The ordinance applies to all land disturbing activities on land within the boundaries and jurisdiction of the City. Agricultural Land Disturbing Activities as defined in this Section are exempt from the requirements of this ordinance. This section applies to the following sites with land disturbing activities:

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1. Those requiring a subdivision plat approval or local improvement location permit for the construction of commercial, residential, or institutional buildings on lots of approved subdivision plats;
2. Those involving grading, removal of protective ground cover or vegetation, excavation, land filling, or other land disturbing activity affecting a surface area of 10,000 square feet or more.
3. Those involving excavation, filling, or a combination of excavation and filling affecting 400 cubic yards or more of soil, sand, gravel, stone, or other material;

This ordinance does not preclude the applicant from acquiring any other necessary local, state and federal permits.

- C. The following principles apply to all land disturbing activities within the City and should be considered in the preparation of submissions required under this ordinance:
1. To minimize the potential for soil erosion, development should fit the topography and soils of the site. Areas with steep slopes where deep cuts and fills may be required should be avoided wherever possible, and natural contours should be followed as closely as possible.
 2. Natural vegetation should be retained and protected wherever possible. Area immediately adjacent to watercourses and lakes also should be left undisturbed wherever possible.
 3. All activities on a site should be conducted in a logical sequence so that the smallest practical area of land will be exposed for the shortest practical period of time during development.
 4. Provision should be made to accommodate the increased runoff caused by changed soil and surface conditions (impervious areas) during and after development.
 5. Minimize the length and grade of slopes to reduce erosion potential.
- D. All erosion control measures including but not limited to those required to comply with this ordinance shall meet the design criteria, standards, and specifications for erosion control measures similar to or the same as those outlined in the "Indiana Handbook for Erosion Control in Developing Areas" published by the Indiana Department of Natural Resources.
- E. The following requirements shall be met on all sites.
1. Sediment-laden water flowing from the site shall be detained by erosion control measures appropriate to minimize sedimentation.
 2. Water shall not be discharged in a manner that causes erosion at or downstream of the point of discharge.
 3. All access to building sites that cross a natural watercourse, drainage easement, or swale/channel shall have a culvert of appropriate size.
 4. Wastes or unused building materials, including but not limited to garbage, debris, cleaning wastes, wastewater, toxic materials, and hazardous substances shall not be carried by runoff from a site. All wastes shall be disposed of in a proper manner.
 5. Sediment being tracked from a site onto public or private roadways shall be minimized. This can be accomplished initially by a temporary gravel construction entrance, in addition to a well planned layout of roads, access drives, and parking areas.

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6. Public or private roadways shall be kept cleared of accumulated sediment. Bulk clearing of sediment shall not include flushing the area with water.
7. All storm drain inlets shall be protected against sedimentation with barriers meeting accepted criteria, standards, and specifications.
8. Runoff passing through a site from adjacent areas shall be controlled by diverting it around disturbed areas. Diverted runoff shall be conveyed in a manner that will not erode the channel and receiving areas. Alternatively, the existing channel may be left undisturbed or improved to prevent erosion or sedimentation from occurring.
9. Drainageways and swales shall be designed and adequately protected so that their final gradients and resultant velocities will not cause channel or outlet scouring.
10. All disturbed ground left inactive for seven or more days shall be stabilized by seeding, sodding, mulching, covering, or by other equivalent erosion control measures.
11. Appropriate sediment control practices shall be installed prior to any land disturbance.
12. During the period of construction activity at a site, erosion control measures necessary to meet the requirements of this ordinance shall be maintained by the applicant.

F. Content Requirements of Erosion Control Plans

Requirements for Projects that will disturb five (5) acres or more of the site:

1. A map of existing site conditions in adequate to show the site and adjacent areas, including:
 - a. Site boundaries and adjacent lands which accurately identify the site location
 - b. Lakes, streams, channels, ditches, wetlands and other water courses on and near the site
 - c. One hundred (100) year floodplains, floodway fringes, and floodways
 - d. Map showing the location of the predominant soil types as identified by the Hancock County Soil Survey, or as determined by a certified professional soil scientist
 - e. Delineation of vegetative cover, such as grass, weeds, brush and trees
 - f. Location and dimensions of storm water drainage systems and natural drainage patterns on and immediately adjacent to the site
 - g. Locations and dimensions of utilities, structures, roads, highways, and paving
 - h. Site topography at a contour interval appropriate to indicate drainage patterns
2. A site construction plan including:
 - a. Locations and dimensions of all proposed land disturbing activities
 - b. Locations and dimensions of soil stockpiles and borrow areas
 - c. Locations and dimensions of all erosion control measures.
 - d. Sequence of construction, including each land disturbing activity and the installation of erosion control measures

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- e. Provisions for maintenance of the erosion control measures
- 3. A plan of final site conditions on the same scale as the existing site map showing proposed site changes.

Requirements for Projects that will disturb less than five (5) acres:

- 4. A site plan, drawn to engineer's scale, including:
 - a. The site or building lot, the proposed building location and the location of existing buildings on the site
 - b. Accurate dimensions of the site, lots and buildings
 - c. Location, size and use of any and all buildings not on the site, but within (50) feet of the site boundaries, unless separated by a street
 - d. Other information as shall be necessary to comply with the zoning ordinance
- 5. An erosion control plan, including:
 - a. Description and location of the specific measures that the applicant proposes to employ to minimize soil erosion and the migration of soil off of the site.
 - b. Sequence of construction, including each land disturbing activity and the installation of erosion control measures.
 - c. Provisions for maintenance of the erosion control measures.
- G. The City shall promptly review the application and erosion control plan to determine whether the requirements of this ordinance have been met. In addition, for projects that will disturb five (5) acres or more, the Conservation District, or their representative, will review and provide the City comments on the erosion control plan. For projects that will disturb less than five (5) acres, the City, at their discretion, may call on the Conservation District for assistance in reviewing the erosion control plans.

If the conditions are met, the City shall approve the plan, inform the applicant, and issue an improvement location permit. If the conditions are not met, the City shall inform the applicant in writing and either may require additional information or may disapprove the plan.

H. Permits

- 1. No person shall begin a land disturbing activity subject to this ordinance without receiving approval of an erosion control plan.
- 2. As a condition of approval and issuance of the improvement location permit, the City may require the applicant to provide a surety bond or an irrevocable letter of credit when the erosion control plan has been approved to guarantee a good faith execution of the erosion control plan and any permit conditions.
- 3. All permits shall require the applicant to:
 - a. Notify the City at least 24 hours before commencing land disturbing activities
 - b. Notify the City prior to modifying the erosion control plan; this will be necessary if planned measures do not suffice in controlling erosion and off-site sedimentation.
 - c. Install all erosion control measures as identified in the approved erosion control plan

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- d. Maintain all road drainage systems, storm water drainage system, erosion control measures, and other facilities identified in the erosion control plan until the project is stable and has been terminated.
 - e. Where authorized, remove accumulated sediment from adjacent areas, including drainageways, and where necessary, repair erosion damage to adjacent areas and drainageways
- I. The City, or their representative, may enter the site for verifying compliance with the erosion control plan, or for performing any work necessary to bring the site into compliance with the erosion control plan.
- J. Enforcement
1. The City shall post a stop-work order if:
 - a. Any land disturbing activity regulated under this ordinance is being undertaken without a permit
 - b. The erosion control plan is not be implemented in good faith
 - c. The conditions of the permit are not being met
 2. If, within thirty (30) days after issuance of a stop-work order, a permit holder does not comply with the erosion control plan or permit conditions, the City may revoke the permit.
 3. A stop-work order may be rescinded by the Zoning Administrator upon request. The Zoning Administrator's decision may be appealed to the Board of Public Works and Safety.
 4. Ten days after revoking the permit, the City may issue a notice of intent to the violator stating that 14 days after issuing the notice of intent the City will use the surety bond to perform work necessary to provide compliance with this ordinance.
 5. Any person violating any of the provisions of this ordinance shall be subject to the penalties as described in Section 152.99.
 6. Compliance with the provisions of this ordinance also may be enforced by injunction.
- K. When a project has been completed, the person holding the permit shall petition, in writing, the City for approval of termination. The City shall subsequently inspect the site to verify the project is complete and stable.
1. For projects with multiple lots; All roads, utilities and other infrastructures, as deemed necessary by the City, must be completed and accepted by the appropriate local agency. All non-paved areas must be stable with established vegetation or other suitable cover.
 2. For all other sites, including individual building lots; all construction must be complete, and all unpaved areas must be stable with established vegetation or other suitable cover. If the termination request is approved, any surety bonds and/or irrevocable letters of credit shall be released by the Board of Public Works and Safety.
- L. The primary approval or disapproval of a plat by the Plan Commission or the imposition of a condition on primary approval is a final decision of the Plan Commission that may be reviewed by certiorari procedure as provided by IC 36-7-4-1016.

(Ord. 1993-2, passed 2-10-B3)

414 CURB AND GUTTER

- A. The Plan Commission shall require curb and gutter to be installed on each side of the street surface.
- B. The curb and gutter shall be of one of the construction types shown in Figure I and shall be constructed according to the following specification:
 - 1. The base for the curb and gutter shall be well-compacted on the existing base or grade.
 - 2. The minimum specifications shall be as shown for the three types of cross sections in Figure 1.
 - 3. All gutters and curbs shall be constructed in conformance with section 605 of the Standard Specifications, or any subsequent amendments thereto. See Figure I for curb types.

(Ord. 1979-24, passed 12-13-79)

416 SIDEWALKS

- A. The Plan Commission shall require sidewalks to be installed on each side of the street in a residential subdivision. In nonresidential subdivisions, the Plan Commission may require sidewalks for the safety of access to places of public assemblage including schools, parks, and churches.
- B. If sidewalks are provided, they shall be constructed of Portland cement concrete (at least 3500 psi tensile strength), at least four inches thick and five feet wide, and the edge of the walks adjacent to the property line of the street shall be placed at least one foot from the property line.
- C. When sidewalks are not provided, the street grade shall be completed so that additional grading would not be necessary for any future provision of sidewalks.

(Ord. 1979-24, passed 12-13-79; Am. Ord. 1988-29, passed 12-8-88)

418 SHOULDERS, SIDE SLOPES, AND DITCHES

- A. All shoulders, side slopes, and ditches shall be prepared in accordance with Section 208 of the Standard Specifications or any subsequent amendments thereto, and construction plans required to be submitted by the applicant.
- B. All shoulders, side slopes, and ditches shall be protected from erosion by either sodding as set forth in Section 621 of the Standard Specifications, or any subsequent amendments thereto, or seeding as set forth in Section 621 of the Standards, as shown on the erosion control plan, which plan shall be a part of the required construction plans to be submitted by the applicant.
- C. Side slopes having a grade in excess of two to one shall be protected by hand lain rip-rap in accordance with Section 616 of the Standard Specifications, or any subsequent amendments thereto, as required on the construction plans to be submitted by the applicant.
- D. Ditches having a grade of 3%, 4% or 5% shall have a gutter consisting of sod, or if in excess of 5% shall have a gutter consisting of concrete or stone as shown on the construction plans to be submitted by the applicant.

(Ord. 1979-24, passed 12-13-79)

420 FLOOD CONTROL

- A. The petitioner shall assure that:
 - 1. The subdivision will minimize flood damage;
 - 2. That public utilities and facilities are constructed so as to minimize flood damage; and
 - 3. Adequate drainage is provided
- B. Base flood elevation data shall be required for subdivisions greater than 50 lots or five acres.

(Ord. 1988-29, passed 12-8-68)

422 STREET LIGHTING SYSTEM

- A. The petitioner/developer shall provide the subdivision with a street lighting system. The quantity, type, and location of street lights will be determined by the Greenfield Board of Public Works and Safety. The petitioner/developer shall provide lighting at all intersections and on streets not to exceed 200 feet between fixtures. Upon approval, by the Greenfield Board of Public Works and Safety, petitioner/developer shall provide Greenfield Power & Light with a set of drawings, to scale, of the accepted development. Greenfield Power & Light's Engineer(s) will provide a lighting design they deem acceptable and consistent with surrounding subdivision(s) and provide the quantity of poles and fixtures needed by the petitioner/developer.
- B. The petitioner/developer will have a choice between two (2) different kinds of aluminum poles specified by Greenfield Power & Light.
 - 1. 18' Direct Burial, Round Tapered Aluminum Pole- Black Powder Coat Finish
 - a. HAPCO – Part Number: B19264-014 / Alum.
 - 2. 12' Decorative Straight Fluted Aluminum Pole – Black Powder Coat Finish
 - a. HAPCO – Part Number: A7S12B4-SF0-BA
- C. The petitioner/developer will have a choice between two (2) different kinds of L.E.D. luminaire fixtures specified by Greenfield Power & Light.
 - 1. Lantern Style LED Post Top Light
 - a. GE Current, Evolve Salem (EPST) Series – Part Number: EPST02006B40AA BLK – 86W
 - 2. Acorn Style LED Post Top Light
 - a. GE Current, Evolve Avery StreetDreams® Series – Part Number: EPAS02006B402AAFBLCK – 86W
- D. The petitioner/developer shall reimburse Greenfield Power & Light for the cost of procuring the pole(s), luminaire fixtures, and any anchor bases needed before any installation will begin.
- E. Finish grade must be established before installation of anchor bases, poles, and/or luminaire fixtures.
- F. Service within Greenfield Power & Light's territory

City of Greenfield Public Improvement Design Standards and Specifications Manual

1. Greenfield Power & Light will be responsible for installation of any conduit, conductor, anchor bases, poles, luminaire fixtures, fusing, photo metrics, terminations points, distribution feeds, and associated labor cost incurred.
2. Service to any of the items under F-1 will be provided by Greenfield Power & Light.

G. Service outside of Greenfield Power & Light's territory

1. Any annexed area, development, or neighborhood served by another Electric Utility will be responsible for installation of any conduit, conductor, anchor bases, poles, luminaire fixtures, fusing, photo metrics, terminations points, distribution feeds, and associated labor cost at the developer or HOA's expense.
 - a. If the annexed area, development, or neighborhood is within the Greenfield city limits, even if serviced by another Electric Utility, the petitioner/developer agrees to install the pole/luminaire fixtures listed above (section B and C) in accordance with the City of Greenfield's Public Improvement Design Standards & Specifications Manual (PIDSSM).
2. Service of any poles or luminaire fixtures will be at the developer's or HOA's expense. Any service performed on poles or luminary fixtures by Greenfield Power & Light can and will be billed to said developer or HOA unless approved by the Mayor, City Council, or the Board of Public Works and Safety.
 - a. For additional information, contact Greenfield Power & Light or the City of Greenfield's Planning Department.

H. Additional Streetlight Pole Specifications

1. General Description
 - a. Aluminum lighting pole with black powder coat finish in either 18' Round Tapered Direct Burial or 12' Decorative Straight Fluted design.
2. Installation Data
 - a. Direct embedded poles, or anchor base mounted poles will be used, choice made by developer.
 - b. The pole shall be set plumb.
 - c. If 12' Decorative Straight Fluted pole is chosen, you must anchor pole on 17" wide x 48" depth concrete pad with 1 1/2" conduit for conductor.
 - d. NOTE: Do not install light pole without luminaire.
3. Pole Shaft Construction
 - a. The pole shall have a minimum wall thickness of .125 inches.
 - b. The pole shall be designed with a minimum factor of safety of 2 and have no more than 10% deflection at full wind loading.
4. Pole Top
 - a. A steel tenon, 3" tall x 3" O.D., shall be firmly bonded to the pole for mounting a post top luminaire. The tenon shall be coated with a matching urethane finish.
5. Handhole – Round Tapered Direct Burial Pole

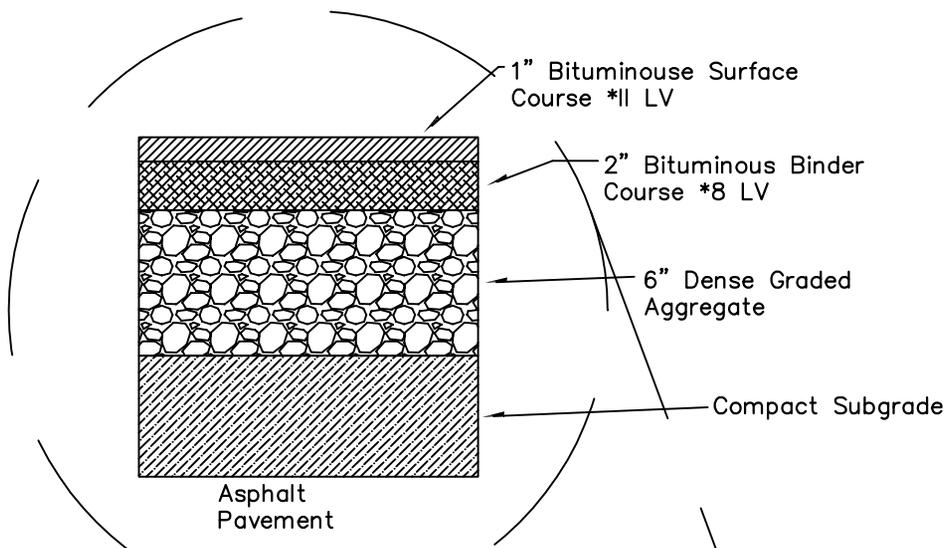
City of Greenfield Public Improvement Design Standards and Specifications Manual

- a. The handhole shall be 2 ½ in. x 5 in. oval, located 18 inches above grade. The cover shall be non-corrosive metal painted to match the pole and secured with a stainless steel, tamper-proof locking screw.
6. Wire Entrance – Round Tapered Direct Burial Pole
 - a. The pole shall have two (2) 1¾” x 6” Slotted Wire Entrance Holes (one on each side) located 18 in. below grade with the round tapered pole and conduit.
7. Finish
 - a. The surface of the pole shall be uniform and consistent for the entire length of the pole.
 - b. A minimum coating thickness of of 2.0 mils shall be maintained for aluminum.
8. Additional Resources
 - a. Find additional resources including but not limited to base and anchorage details, specifications, installation material, and more at www.hapco.com

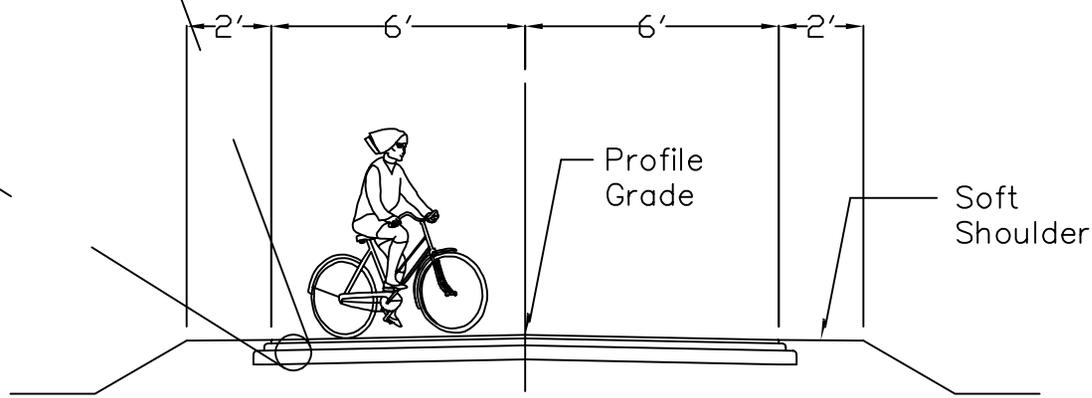
(Ord. 1979-24, passed 12-13-79)

APPENDIX A – STANDARD CONSTRUCTION DETAILS

| | Detail Description & File Name |
|-----------|---|
| P-127-01 | Multi-use Pathways |
| P-128-01 | Bicycle Lanes Design |
| P-129-01 | Wide Curb Lane Design |
| P-130-01 | Shared Shoulder Design |
| P-131-02 | Local Street Cross-Section |
| P-131-02 | Collector Street Cross-Section |
| P-133-02 | Secondary Arterial Cross-Section |
| PL-126-01 | Street Lights |
| SN-115-02 | Sanitary Sewer Manhole |
| SN-134 | Commercial Grease Trap |
| SN-135 | Sanitary Sewer Drop Manhole |
| SN-136 | Clean-out Type 2 |
| SN-138 | Sewer Lateral Backfill and Bedding |
| SN-137 | Mainline Sewer Backfill and Bedding |
| ST-116-01 | Hancock Legal Court Drain Tile Crossing |
| ST-117-01 | Storm Sewer Catch Basin |
| ST-118-01 | Storm Sewer Inlet |
| ST-119-01 | Storm Sewer Manhole |
| ST-141-00 | Individual Lot Post-construction Sediment Control |
| R-100-01 | Alley Pavement Repair |
| R-101-01 | Asphalt Street Cut Repair |
| R-102-01 | Concrete Street Cut Repair |
| R-103-01 | Curb Termination |
| R-104-01 | Integral Driveway |
| R-105-01 | Mailbox Assembly |
| R-106-02 | MH Casting Adj. - Asphalt Street |
| R-107-01 | MH Casting Adj. - Concrete Street |
| R-108-01 | Retaining Wall |
| R-109-01 | Roll Curb |
| R-110-01 | Sidewalk Ramp |
| R-111-01 | Standard Sidewalk |
| R-112-01 | Straight Concrete Curb |
| R-113-01 | Vertical Curb & Gutter |
| R-114-01 | Winter Season Street Cut Repair |
| W-120-03 | Water Valve |
| W-121-05 | Fire Hydrant Assembly |
| W-123-02 | Typical Hydrant Installations |
| W-124-03 | Water Lateral Detail |
| W-125-03 | Typical Connection to Main |
| W-139-1 | Fire Department Connection |
| W-140-1 | 3/4" Meter Pit |
| W-141 | Water Meter with Backflow |
| W-142 | 2 Inch Tap Detail |
| | |

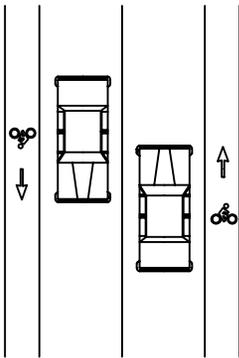


Typical Cross Section Multi-Use Pathway

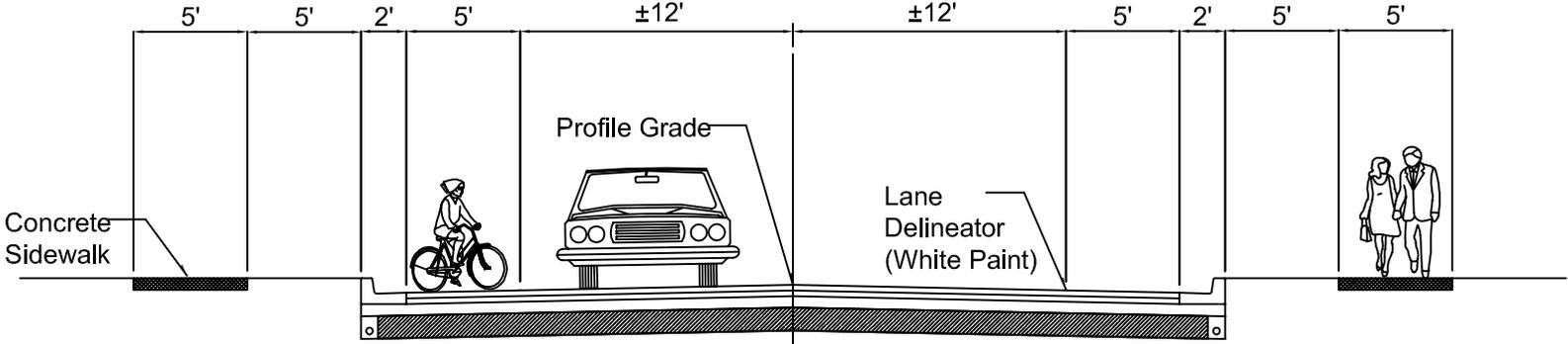


| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| Multi-Use Pathways | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 12/29/98 |
| Des. No: P-127-01 | Rev. Date: 08/29/08 |

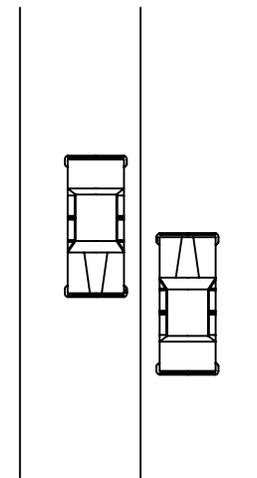
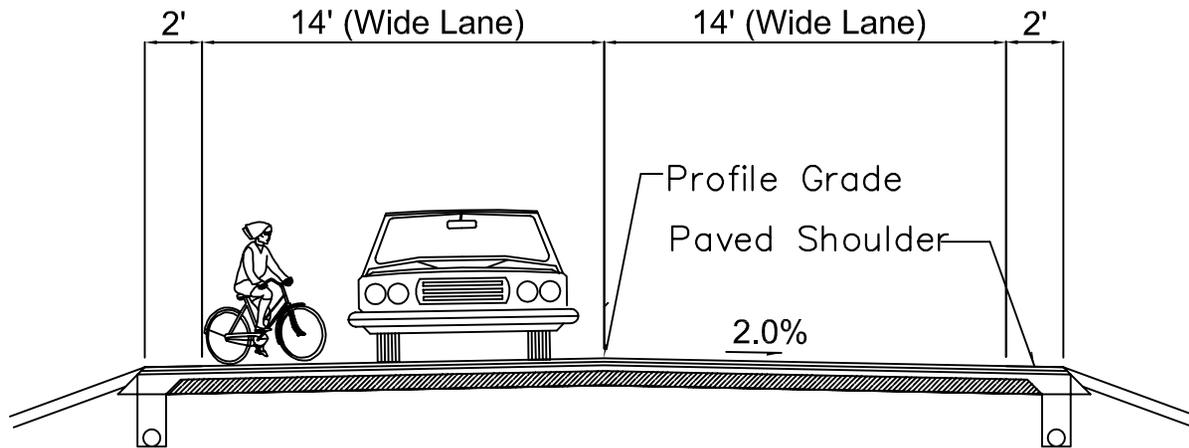
Typical Cross Section Bicycle Lanes Design Option



Plan View



| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| Bicycle Lanes Design | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 12/29/98 |
| Des. No: P-128-01 | Rev. Date: 08/29/08 |



Plan View

Typical Cross Section
Wide Curb Design Option

CITY OF GREENFIELD

STANDARD DETAIL

Wide Curb Lane Design

Dwn.By: *D.Rodgers*

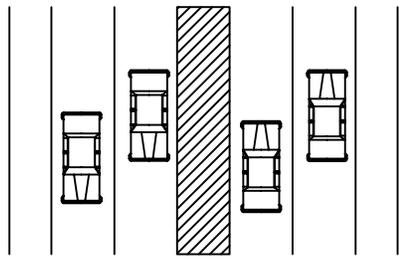
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Des. No:

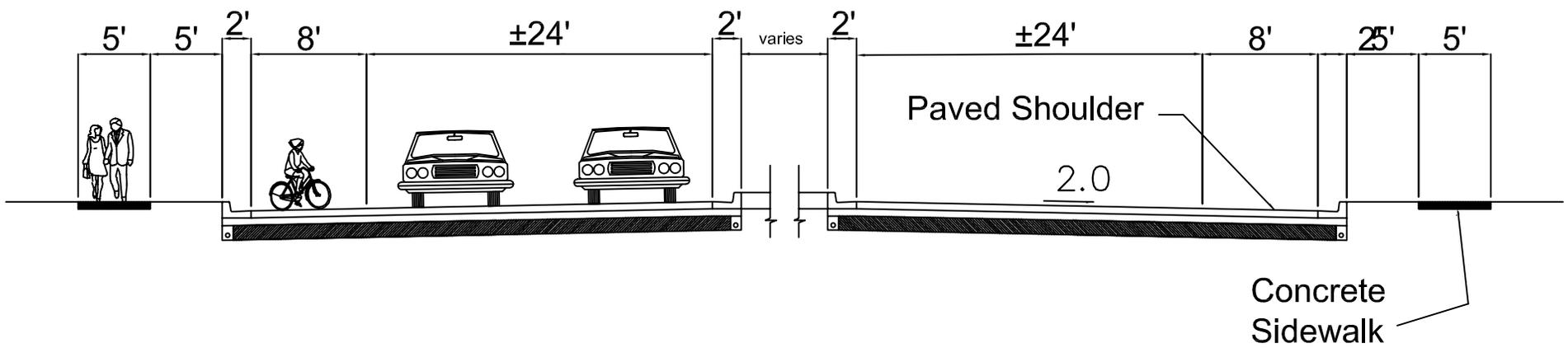
P-129-01

Rev. Date:

08/29/08

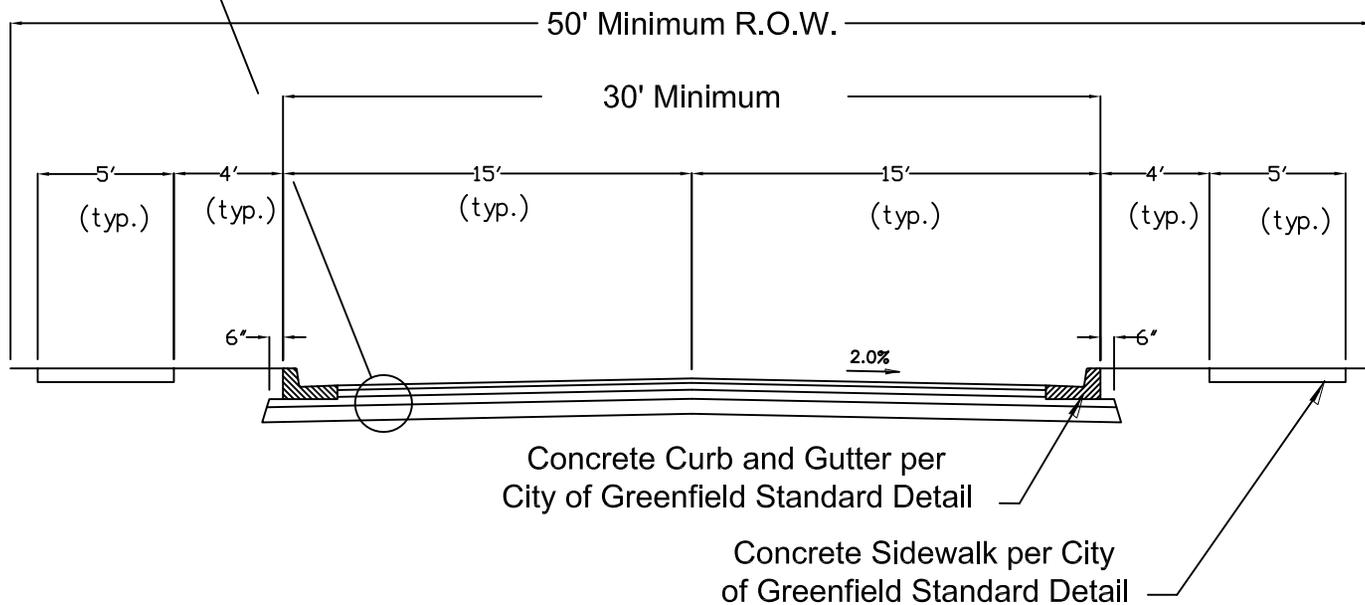
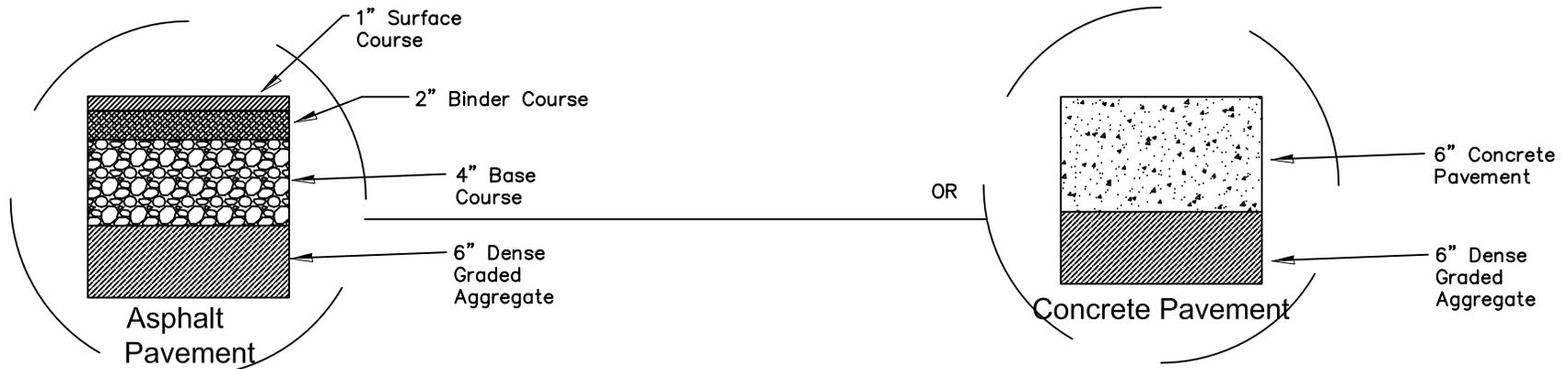


Plan View



Typical Cross Section
Shared Shoulder Design
Option

| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| Shared Shoulder Design | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 12/29/98 |
| Des. No: P-130-01 | Rev. Date: 08/29/08 |



Typical Cross Section
Local

CITY OF GREENFIELD

STANDARD DETAIL

Local Street Cross-Section

Dwn.By: *D.Rodgers*

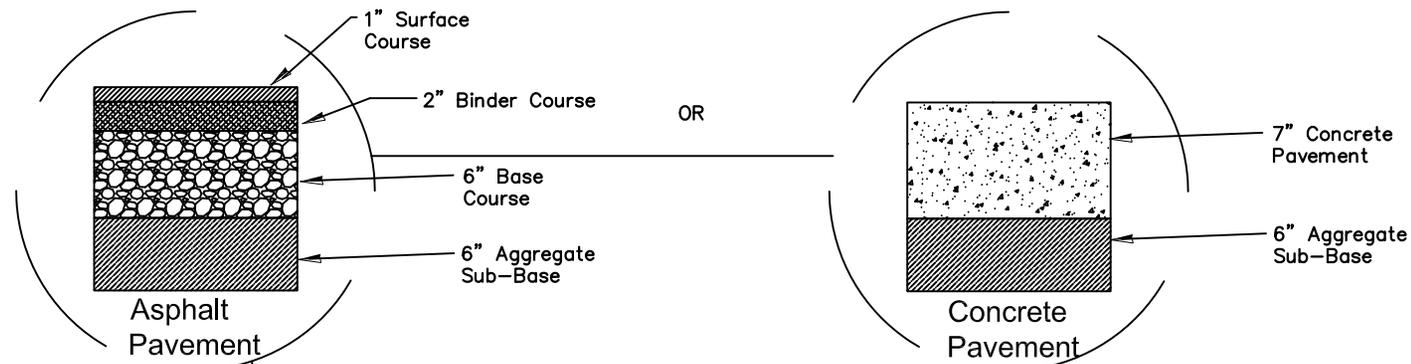
Origin Date: 12/29/98

Des. No:

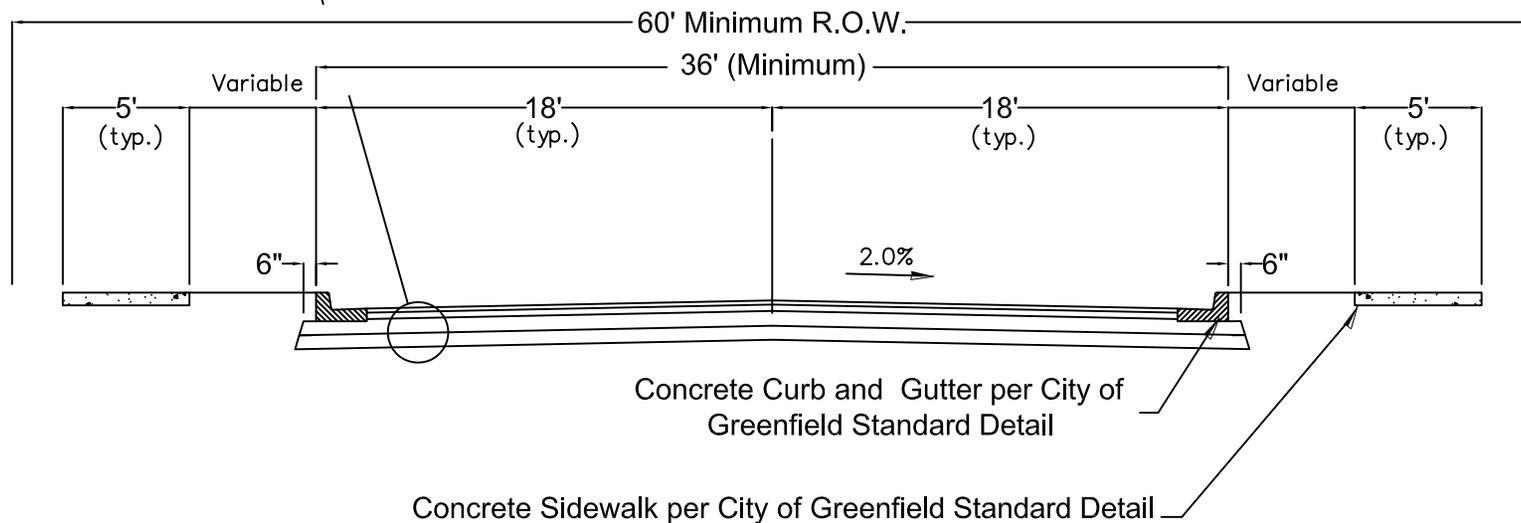
P-131-02

Rev. Date:

9/4/14



Typical Cross Section
Collector



CITY OF GREENFIELD

STANDARD DETAIL

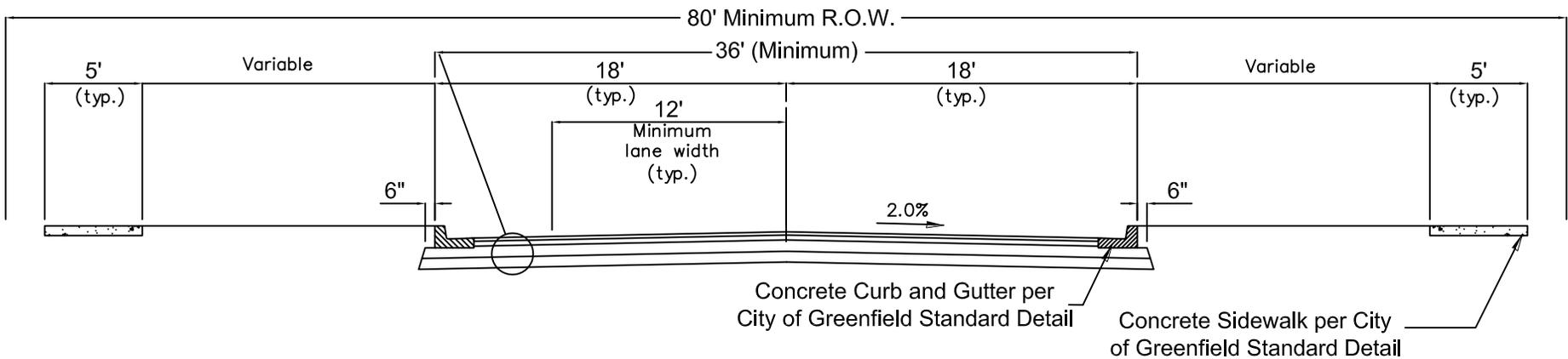
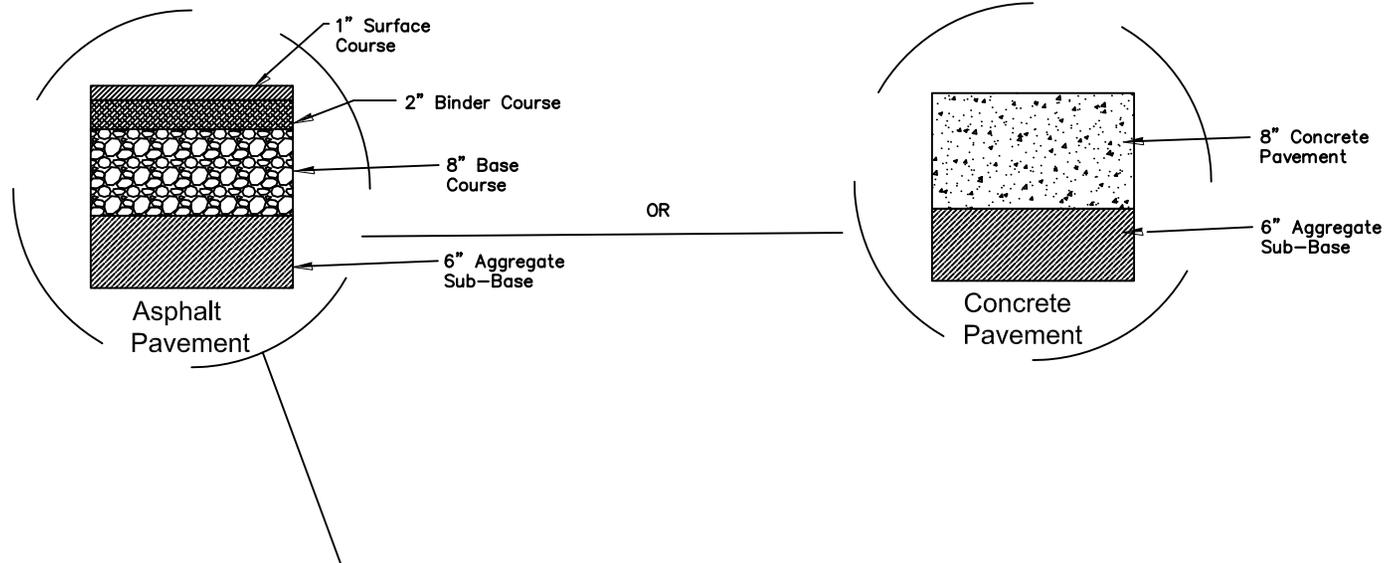
Collector Street Cross-Section

Dwn.By: *D.Rodgers*

Origin Date: 12/29/98

Des. No:

P-132-02 Rev. Date: 09/04/14



Typical Cross Section
Secondary Arterial

CITY OF GREENFIELD

STANDARD DETAIL

Secondary Arterial Cross-Section

Dwn.By: *D.Rodgers*

Origin Date: 12/29/98

Des. No:

P-133-02

Rev. Date:

09/05/14

Street Light Poles – Aluminum

Choice 1: Round, tapered, smooth aluminum pole. 18 ft. height (14 ft. above ground level). Black powder coat finish. Manufactured by HAPCO Pole Products.

Part Number: B19264-014 /ALUM

(Price: Market Rate)

Choice 2: Decorative Straight Fluted Aluminum Pole. 12 ft. height set on a concrete foundation. Black powder coat finish. Manufactured by HAPCO Pole Products.

Part Number: A7S12B4-SF0-BA

(Price: Market Rate)

Luminaire

Choice 1: GE Evolve – Lantern Salem Post Top (EPST)

Part Number: EPST02006B40AABLCK – 86W

(Price: Market Rate)

Choice 2: GE Evolve – Acorn Avery StreetDreams®

Part Number: EPAS02006B402AAFBLCK – 86W

(Price: Market Rate)

CITY OF GREENFIELD

STANDARD DETAIL

STREET LIGHTS

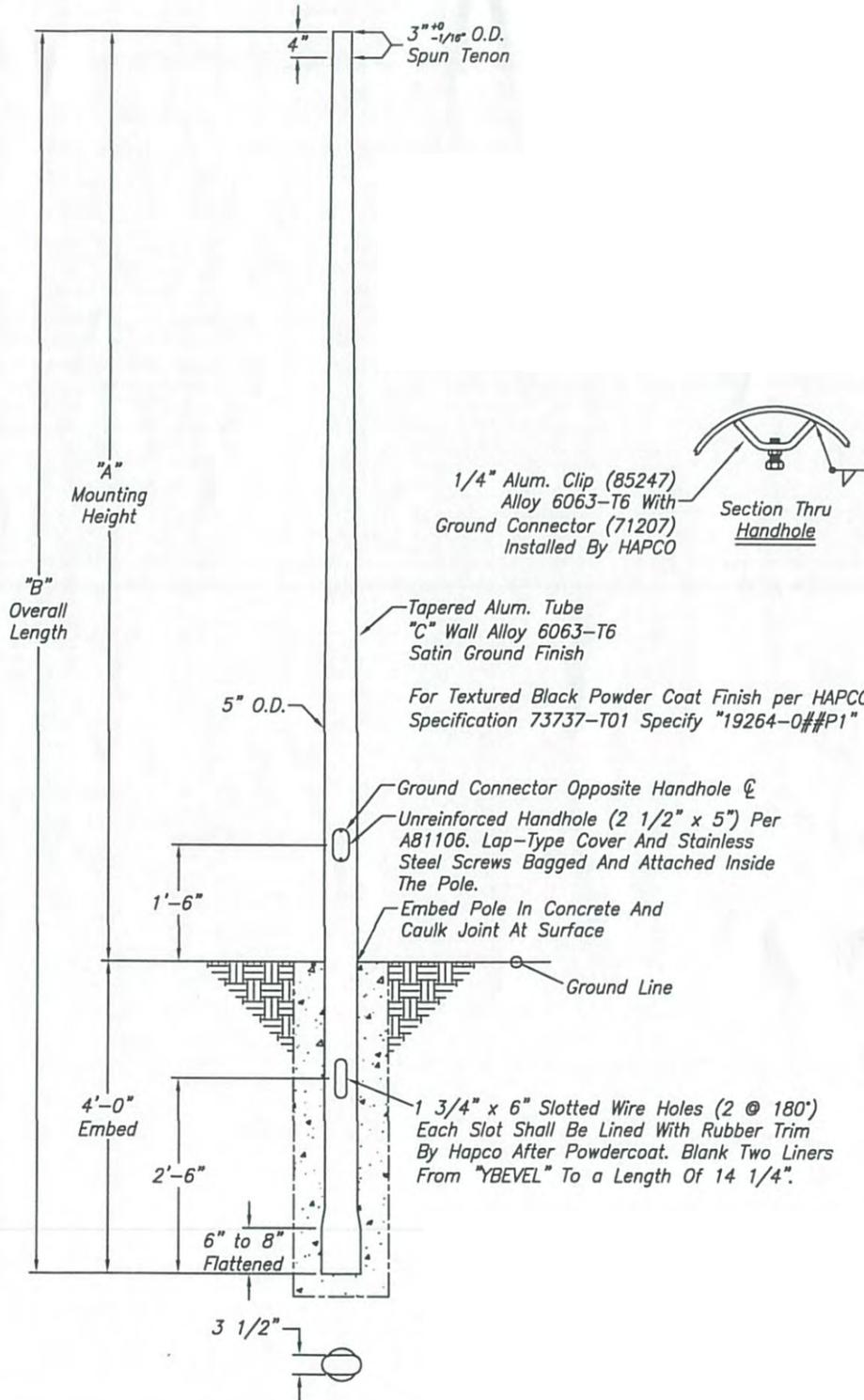
| | |
|----------------------------|--------------------------------|
| Dwn. By: P. Byerley | Origin Date: 12/29/1998 |
| Des. No: PL-126-02 | Rev. Date: 05/17/2021 |

STREET LIGHT POLES

CHOICE 1

18' Direct Buried Tapered Aluminum Pole

Black Powder Coat Finish



Embed Detail

Direct Buried Pole bottom section on 6"+ butt diameter poles will be partially flattened into an anti-rotational, oval cross section. Wire access will be provided 24" below ground line. Soil conditions vary by site. Foundation requirements should be determined by a qualified Structural Engineer with knowledge of jobsite soil conditions.



| DATA | |
|---------------------|---------|
| Overall Pole Length | 18 ft. |
| Mounting Height | 14 ft. |
| Wall Thickness | .125 in |
| Butt Diameter | 4 in |
| Top Diameter | 3 in |
| Bolt Projection | N/A |
| Bolt Size | N/A |



Manufacture: HAPCO Pole Products

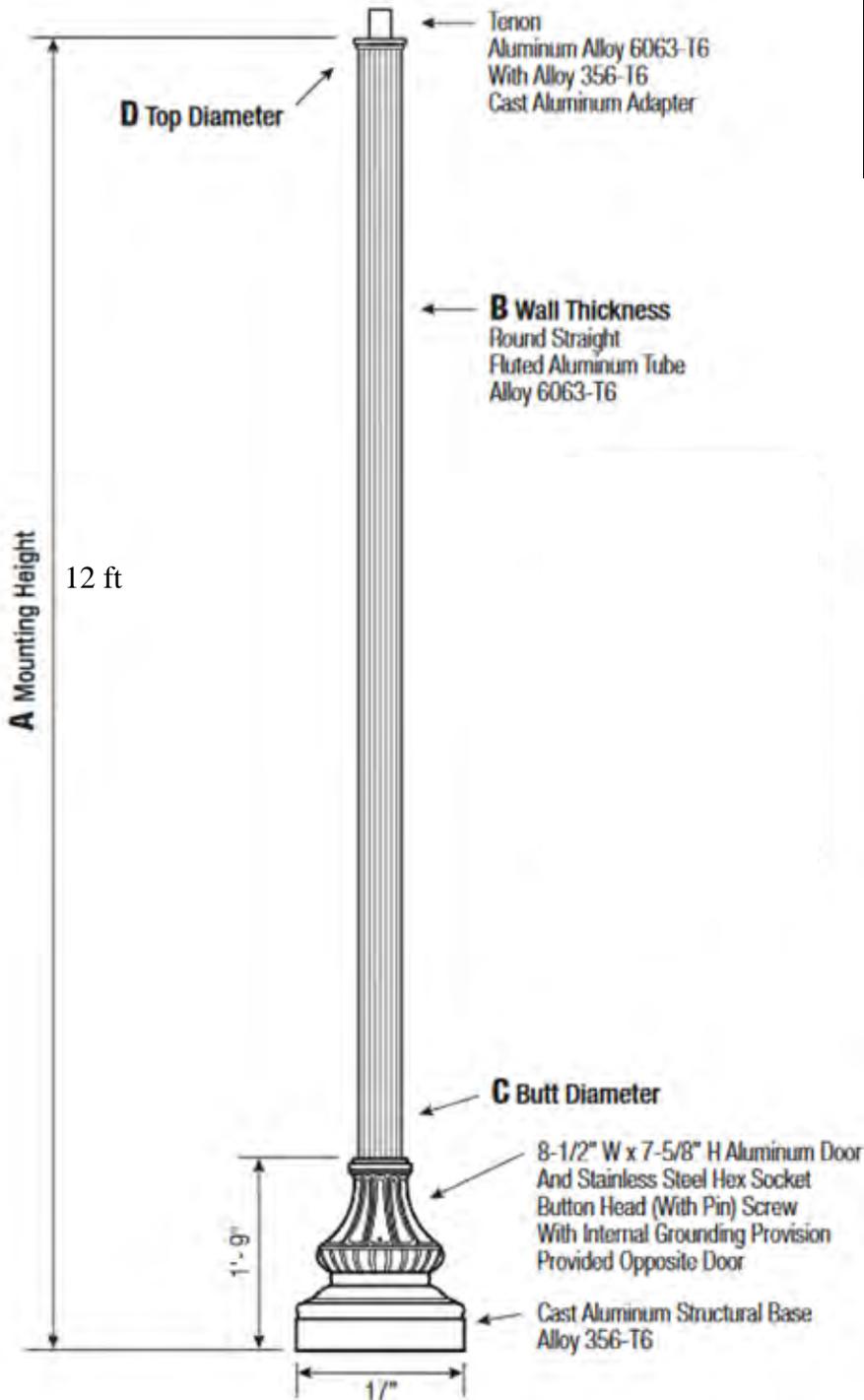
Part Number: B19264-014 /Alum.

Date: 05/05/2021

WARNING: DO NOT INSTALL LIGHT POLE WITHOUT LUMINAIRE.

STREET LIGHT POLES

CHOICE 2 **12' Decorative Straight Fluted Aluminum Pole**
Black Powder Coat Finish



- REQUIREMENTS**
- Concrete foundation
 - Galvanized anchor bolts
 - 1 1/2" Conduit in concrete

Anchorage

Anchorage Kit will include four (4) L-shaped Steel Anchor Bolts conforming to AASHTO M314-90 Grade 55. Ten inches (10") of threaded end will be galvanized per ASTM A153. Kits will contain four (4) Hex Nuts, four (4) Lock Washers, and four (4) Flat Washers (all components Galvanized Steel). A bolt circle template will be provided.

NOTE: All ARLEN 17 pole options may be specified in designs utilizing Direct Buried anchorage.

| DATA | |
|-----------------|--------------|
| Mounting Height | 12 ft. |
| Wall Thickness | .125 in |
| Butt Diameter | 4 in |
| Top Diameter | 4 in |
| Base Diameter | 17 in |
| Base Depth | 48 in |
| Bolt Circle | 11-12 in |
| Bolt Projection | 2 in |
| Bolt Size | .75 x 17 x 3 |



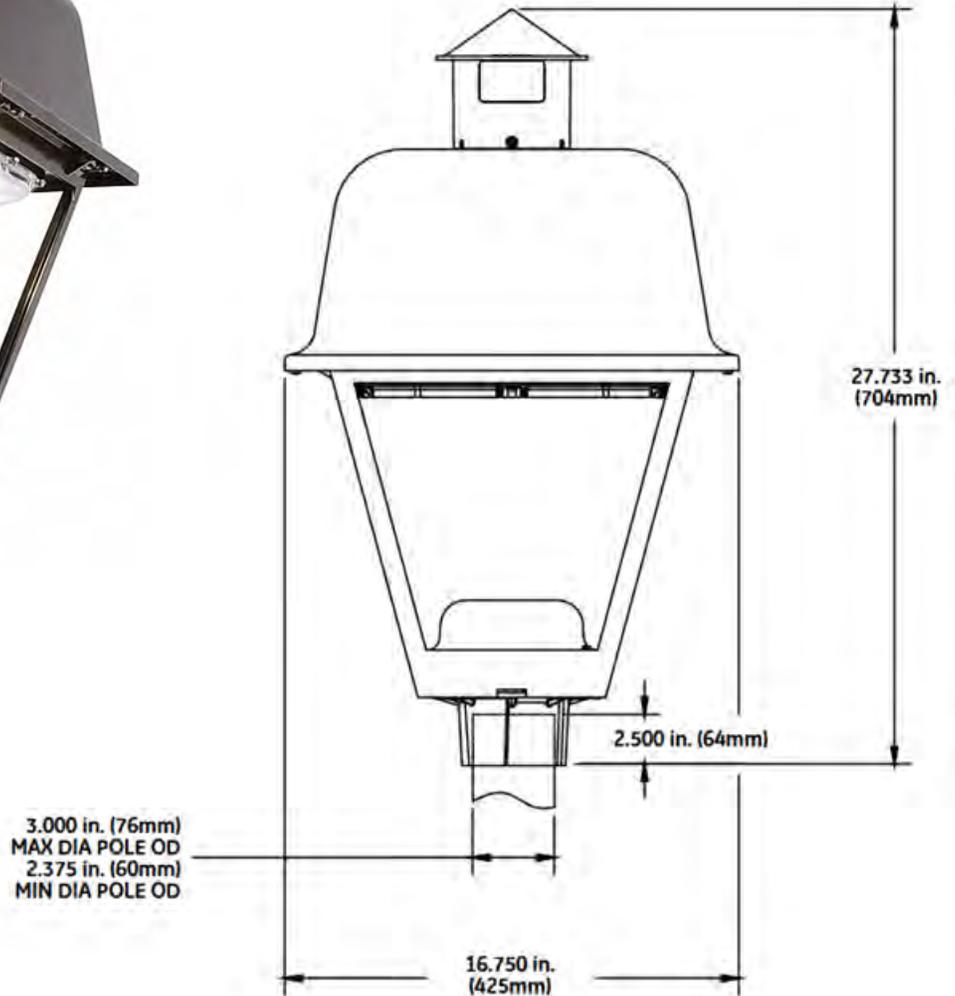
Manufacture: HAPCO Pole Products
 Part Number: A7S12B4-SF0-BA
 Date: 05/17/2021

WARNING: DO NOT INSTALL LIGHT POLE WITHOUT LUMINAIRE.

STREET LUMINAIRE

CHOICE 1

Lantern Style LED Post Top Light
GE Current – Evolve Salem (EPST) Series



| | |
|---------------------|--|
| DATA | Approximate Net Weight: 23 lbs |
| | Input Voltage: 120-277V |
| | Input Frequency: 50/60Hz |
| | Output Range: 6,880 Lumens |
| | Safety: UL/cUL listed per UL1598 |
| | Operating Temperature: -40 °C to +50 °C |
| Color: Black | |

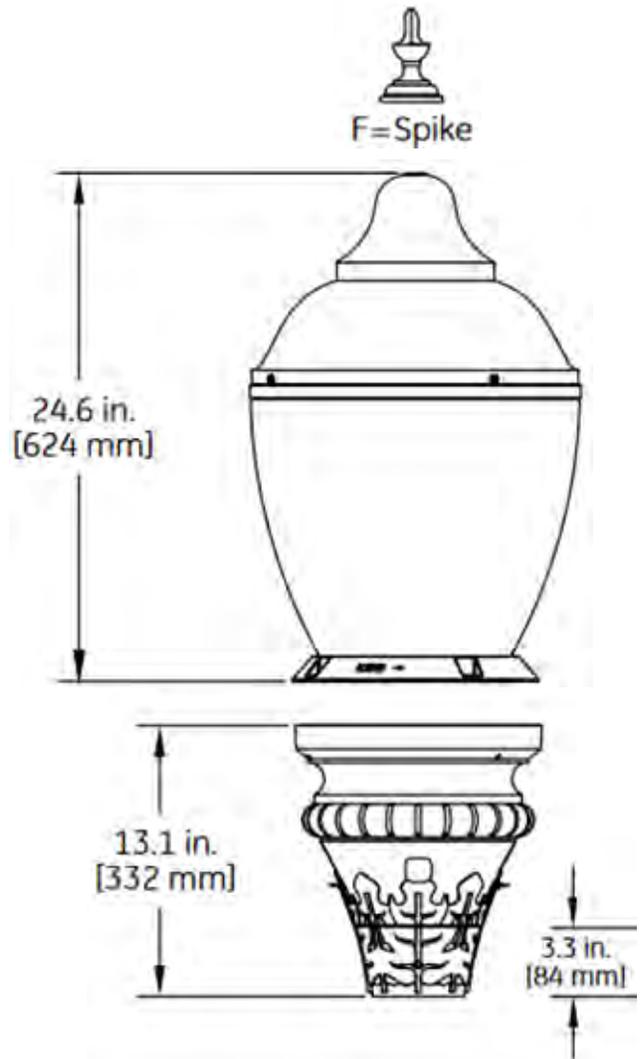
| | |
|---|--|
| GE current a Daintree company | Manufacture: GE – Evolve Series - Salem |
| | Part Number: EPST02006B40AA BLK – 86W |
| | Date: 05/05/2021 |

STREET LUMINAIRE

CHOICE 2

Acorn Style LED Post Top Light

GE Current – Evolve Avery StreetDreams® Series



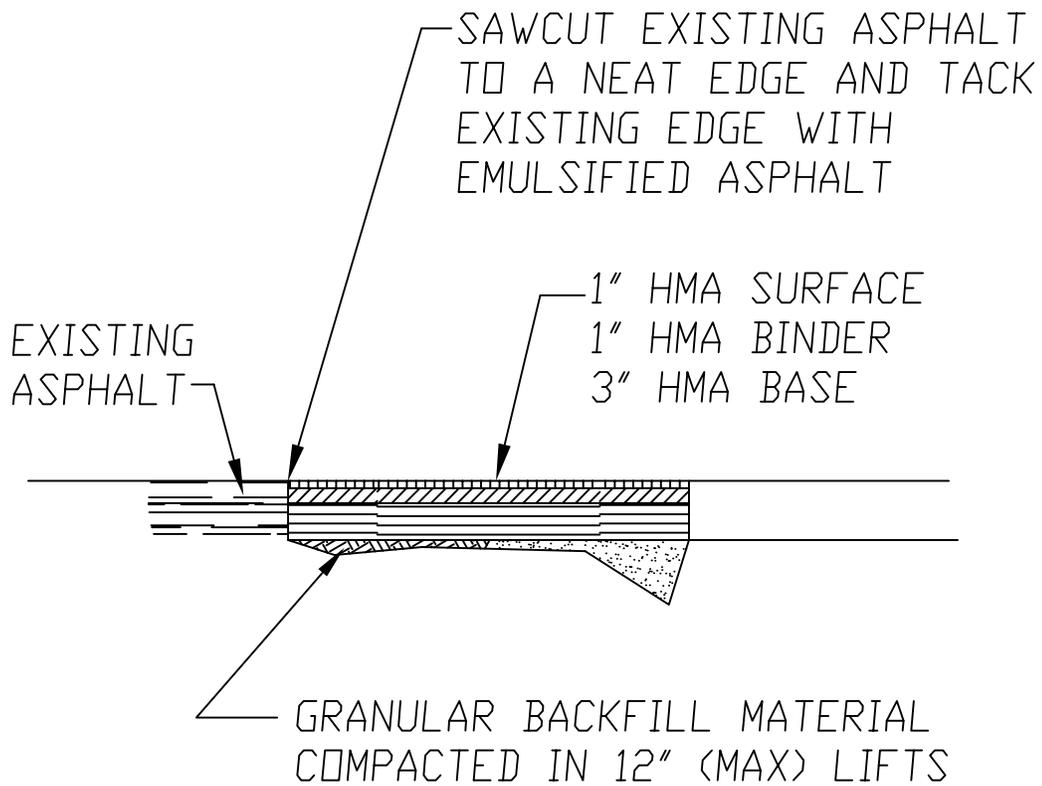
| | |
|-------------|--|
| DATA | Approximate Net Weight: 43 lbs |
| | Input Voltage: 120-277V |
| | Input Frequency: 50/60Hz |
| | Output Range: 8,000 Lumens |
| | Safety: UL/cUL listed per UL1598 |
| | Operating Temperature: -40 °C to +50 °C |
| | Color: Black |

GE current
a Daintree company

Manufacture: GE – Evolve Series - Avery

Part Number: EPAS02006B402AAFBLCK – 86W

Date: 05/05/2021



**TYPICAL ASPHALT
ALLEY CONSTRUCTION
AND REPAIR**

CITY OF GREENFIELD

STANDARD DETAIL

ALLEY PAVEMENT REPLACEMENT DETAIL

Dwn.By: *D.Rodgers*

Origin Date: 11/30/07

Des. No: R-100-01

Rev. Date: 12/10/07

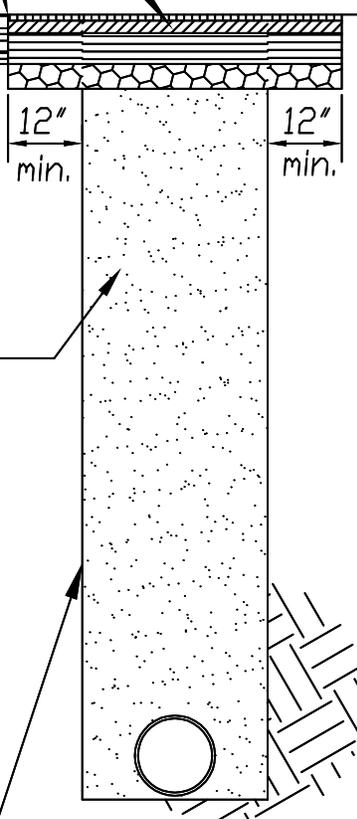
SAWCUT EXISTING ASPHALT
TO A NEAT EDGE AND TACK
WITH EMULSIFIED ASPHALT
WHEN PLACING THE PATCH

- 1" HMA SURFACE
- 2" HMA BINDER
- 8" HMA BASE (ARTERIAL) *
- 6" HMA BASE (COLLECTOR/FEEDER) *
- 4" HMA BASE (RESIDENTIAL) *
- 4" COMPACTED AGGREGATE SUBBASE
- * SEE THOROUGHFARE PLAN

EXISTING
ASPHALT

GRANULAR
BACKFILL
MATERIAL
COMPACTED
IN 12"
MAXIMUM LIFTS

THE CONTRACTOR IS
RESPONSIBLE FOR
TRENCH GEOMETRY
DESIGN AND
EXCAVATION SAFETY
PROCEDURES



NOTE: When using this
detail, determine the
street type and
cross out those
classifications which
do not apply.

CITY OF GREENFIELD

STANDARD DETAIL

ASPHALT STREET CUT REPAIR DETAIL

Dwn.By: *D.Rodgers*

Origin Date: 12/29/98

Des. No: R-101-01

Rev. Date: 12/10/07

ASPHALT PAVEMENT REPAIR SPECIFICATIONS

I. MATERIALS

A. ASPHALT

1. Asphalt Material shall meet the requirements of Section 403 of the INDDOT Standard Specifications.
2. The required thickness of the pavement patch is based on the Thoroughfare Designation as established by the Greenfield Comprehensive Plan.

B. BEDDING AND BACKFILL

1. Granular material must be used to backfill the excavation. The material must be mechanically compacted in lifts not to exceed 12".

II. EXECUTION

A. TRAFFIC SAFETY

1. Road Closures are not allowed except when specifically approved by the City of Greenfield Police Department Traffic Safety Officer.
2. The Worksite Traffic Control Manual as published by INDDOT shall be used as a guideline for establishing traffic control and safety measures for all road cuts and pavement repairs.
3. The worksite must be completely protected from vehicular and pedestrian traffic at all times. The use of Type II Barricades with flashing lights or drums with flashing lights is required.
4. All Traffic Control and Safety Equipment and sufficient personnel to erect and operate the equipment must be onsite before any construction in the Right-of-Way begins.

B. PERMIT REQUIRED

1. A Right of Way Cut Permit is required before any work is performed in the City Right-of-Way.
2. The Right of Way Cut Permit is issued by the City Engineers Office.

INSTALL #4 J-BARS
@ 18" O.C. ALONG
ENTIRE LENGTH
OF MATCHLINE

8" CONCRETE (ARTERIAL) *
7" CONCRETE (COLLECTOR/FEEDER) *
6" CONCRETE (RESIDENTIAL) *
4" COMPACTED AGGREGATE SUBBASE

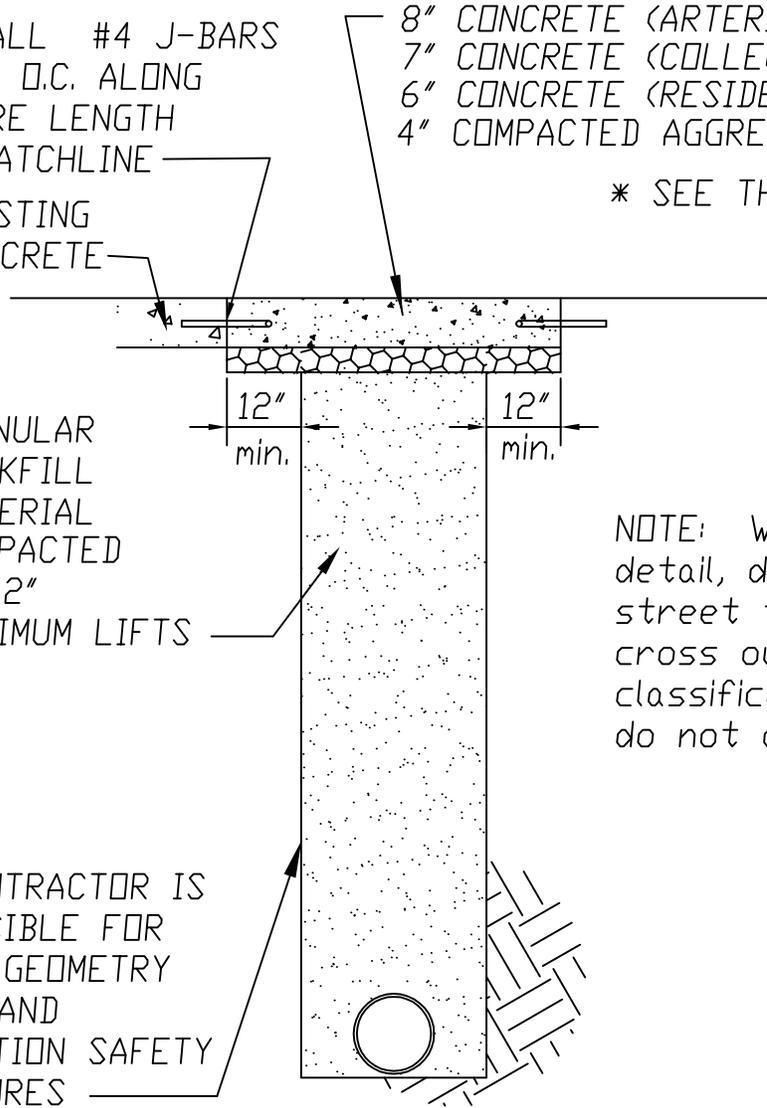
* SEE THOROUGHFARE PLAN

EXISTING
CONCRETE

GRANULAR
BACKFILL
MATERIAL
COMPACTED
IN 12"
MAXIMUM LIFTS

NOTE: When using this
detail, determine the
street type and
cross out those
classifications which
do not apply.

THE CONTRACTOR IS
RESPONSIBLE FOR
TRENCH GEOMETRY
DESIGN AND
EXCAVATION SAFETY
PROCEDURES



CITY OF GREENFIELD

STANDARD DETAIL

CONCRETE STREET CUT REPAIR DETAIL

Dwn.By: *D.Rodgers*

Origin Date: 12/29/98

Des. No: R-102-01

Rev. Date: 12/10/07

CONCRETE PAVEMENT REPAIR SPECIFICATIONS

I. MATERIALS

A. CONCRETE

1. Concrete shall be a High-Early-Strength mix capable of supporting vehicular traffic within 12 hours.
2. Concrete Material shall meet the requirements of Section 702 of the INDOT Standard Specifications.
3. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
4. The required thickness of the concrete patch is based on the Thoroughfare Designation as established by the Greenfield Comprehensive Plan.
5. J-Bars are required as shown in the drawing. Other types of load transfer joints may be approved prior to construction.

B. BEDDING AND BACKFILL

1. Granular material must be used to backfill the excavation. The material must be mechanically compacted in lifts not to exceed 12".

II. EXECUTION

A. TRAFFIC SAFETY

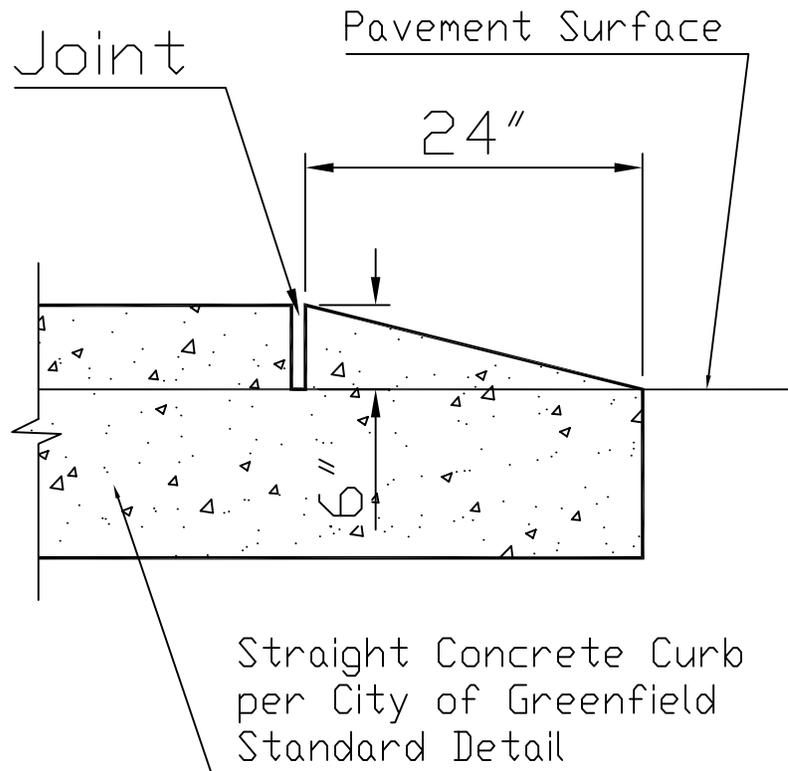
1. Road Closures are not allowed except when specifically approved by the City of Greenfield Police Department Traffic Safety Officer.
2. The Worksite Traffic Control Manual as published by I.D.O.T. shall be used as a guideline for establishing traffic control and safety measures for all road cuts and pavement repairs.
3. The worksite must be completely protected from vehicular and pedestrian traffic at all times. The use of Type II Barricades with flashing lights or drums with flashing lights is required.
4. All Traffic Control and Safety Equipment and sufficient personnel to erect and operate the equipment must be onsite before any construction in the Right-of-Way begins.

B. PERMIT REQUIRED

1. A Right Of Way Cut Permit is required before any work is performed in the City Right-of-Way.
2. The Right Of Way Cut Permit is issued by the City Engineers Office.

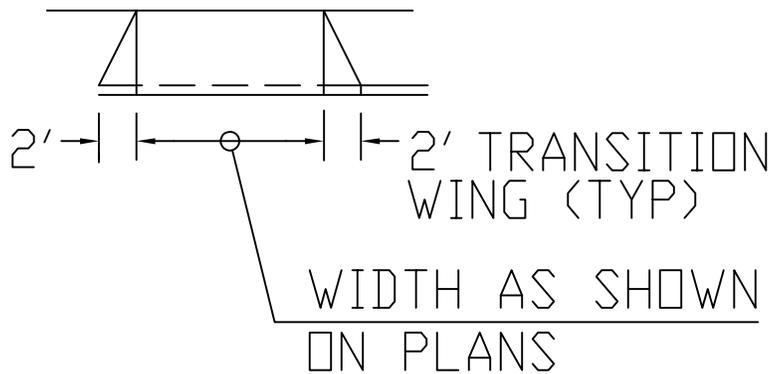
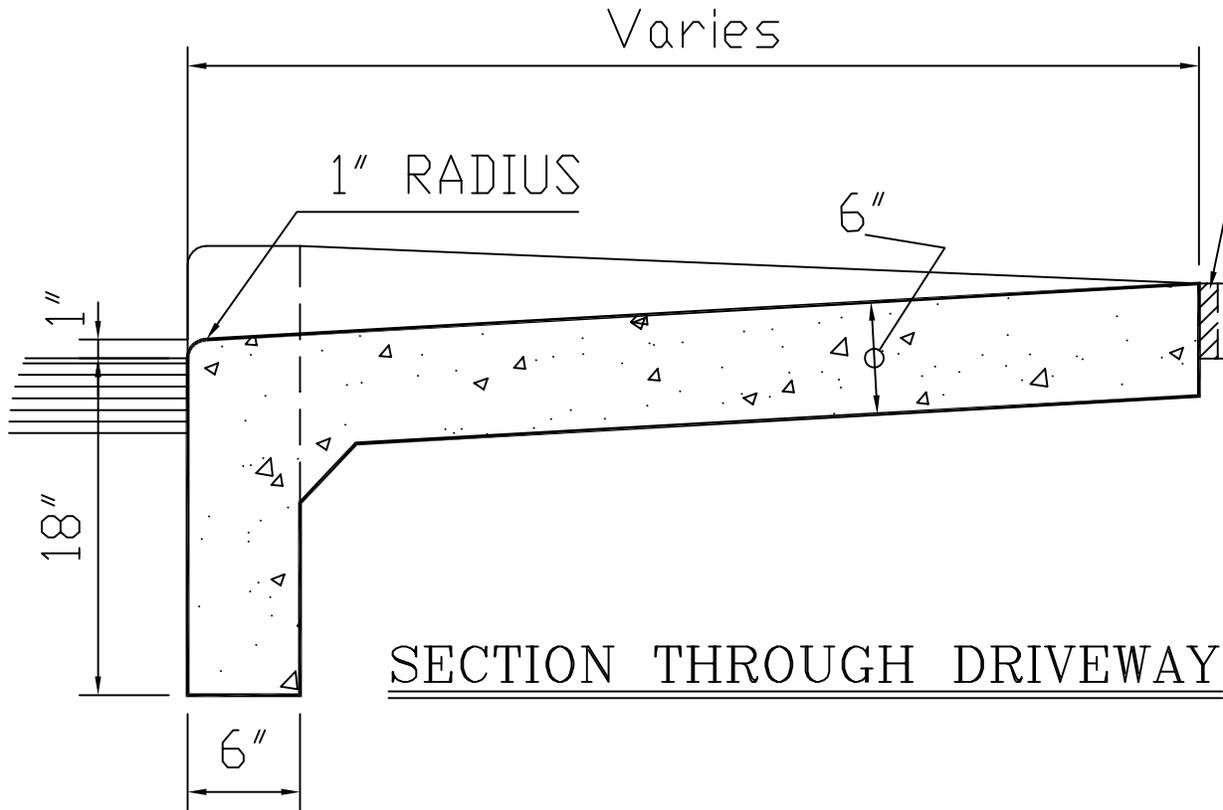
CONSTRUCTION SPECIFICATIONS

1. Concrete Material shall meet the requirements of Section 702 of the Indiana Department of Transportation Standard Specifications.
2. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
3. Install topsoil, grass seed and mulch in all lawn areas disturbed by construction.
4. Sawcut existing pavement to a neat edge on any line where new construction meets existing pavement.
5. Provide tooled or sawn joints in concrete at 10 foot intervals.
6. This Detail shall be used in all locations where new curb construction is terminated without adjoining an existing curb or abutting another structure.



| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| CURB TERMINATION | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 11/30/07 |
| Des. No: R-103-01 | Rev. Date: 12/10/07 |

EXPANSION JOINT MATERIAL



CITY OF GREENFIELD

STANDARD DETAIL

INTEGRAL DRIVEWAY DETAIL

Dwn.By: *D.Rodgers*

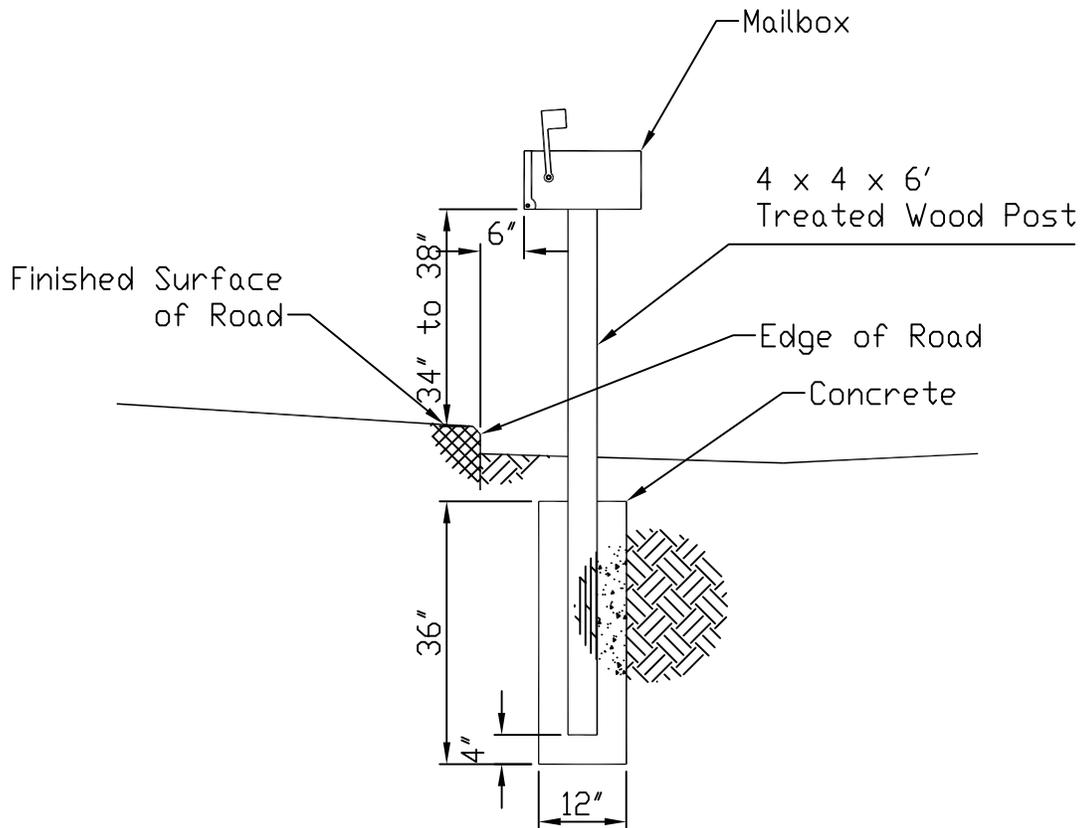
Origin Date: 12/29/98

Des. No: R-104-01

Rev. Date: 12/10/07

CONSTRUCTION SPECIFICATIONS

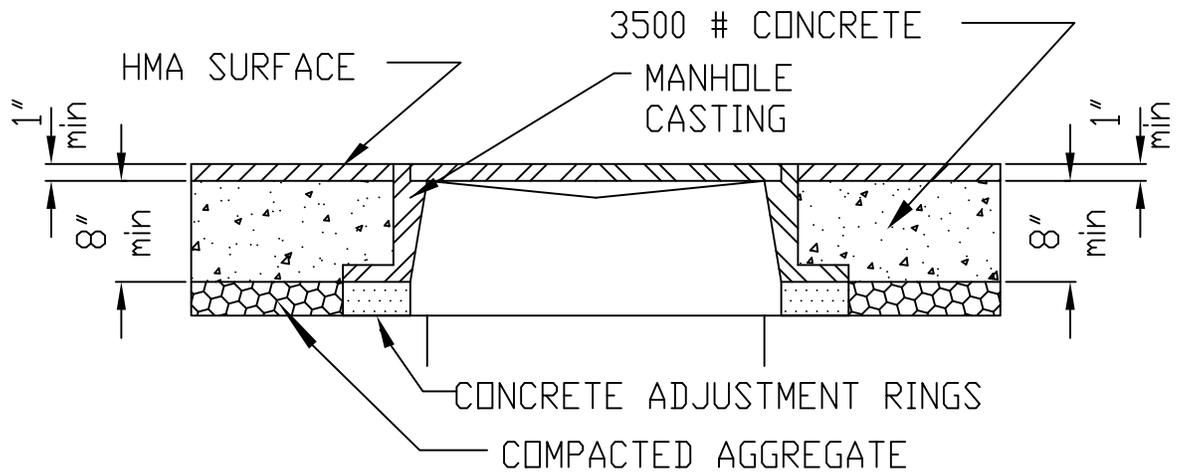
1. Concrete Material shall meet the requirements of Section 702 of the Indiana Department of Transportation Standard Specifications.
2. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
3. Install topsoil, grass seed and mulch in all lawn areas disturbed by construction.
4. Sawcut existing pavement to a neat edge on any line where new construction meets existing pavement. (In concrete at 10 foot intervals).



NOTES:

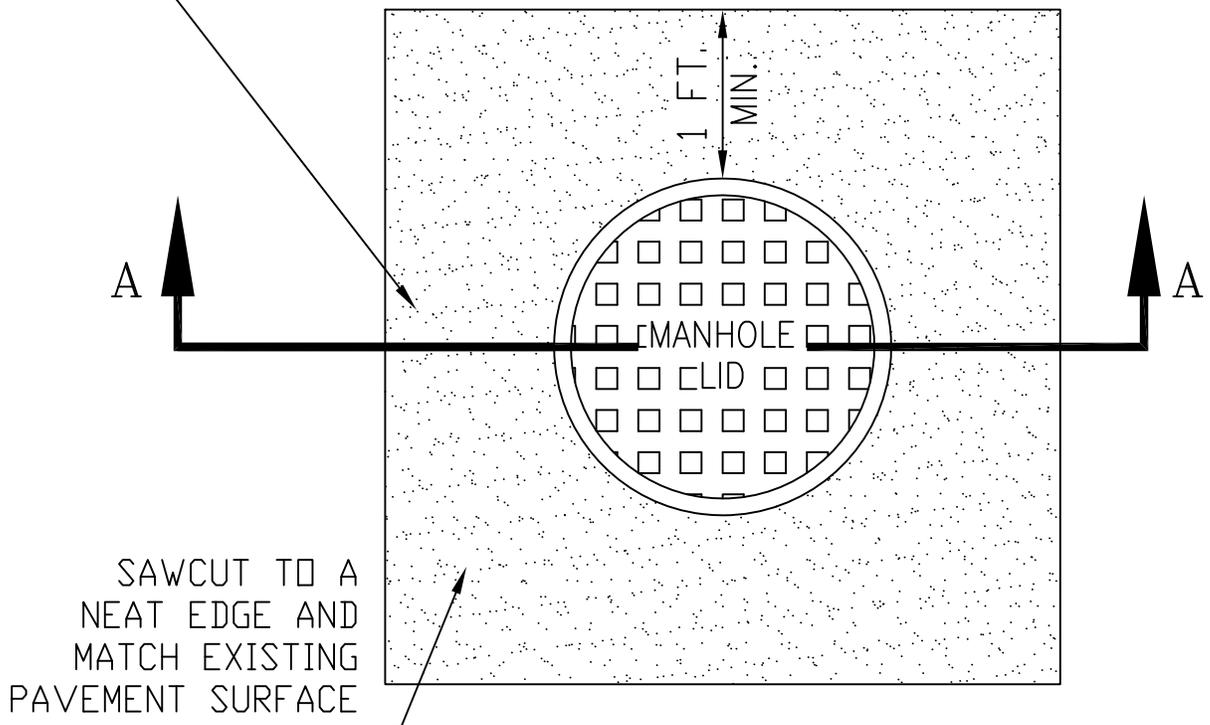
1. All Mailbox assemblies are to be relocated, rebuilt, repaired or reinstalled or furnished new as needed to achieve uniform conformance to the dimensional standards displayed in this detail.
2. Any unusable components of existing mailbox assemblies shall remain the property of the owner.
3. Daily mail delivery shall be accommodated and maintained uninterrupted throughout the entire duration of this project. Complete provision shall be made for the mail carrier and the homeowner for delivery and receipt of mail.
4. The Owners Project Manager reserves the right to interpret the applicability of anything contained in the above notes.

| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| Mailbox Assembly | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 11/04/97 |
| Des. No: R-105-01 | Rev. Date: 12/10/07 |



SECTION "A-A"

REMOVE EXISTING PAVEMENT
AND REPLACE WITH MINIMUM
8" OF CONCRETE, TOPPED
WITH 1" OF HMA SURFACE



CITY OF GREENFIELD

STANDARD DETAIL

Manhole Casting Adjustment in Asphalt Street

Dwn.By: D.Rodgers

Origin Date: 01/05/99

Des. No: R-106-02

Rev. Date: 9/30/10

MANHOLE ADJUSTMENT IN ASPHALT STREET SPECIFICATIONS

I. MATERIALS

A. CONCRETE

1. Concrete shall be a High-Early-Strength mix capable of supporting vehicular traffic within 12 hours.
2. Concrete Material shall meet the requirements of Section 702 of the INDOT Standard Specifications.
3. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
4. The required thickness of the concrete patch is based on the Thoroughfare Designation as established by the Greenfield Comprehensive Plan.
5. J-Bars are required as shown in the drawing. Other types of load transfer joints may be approved prior to construction.

B. ASPHALT

1. Asphalt Material shall meet the requirements of Section 403 of the I.D.O.T. Standard Specifications.

C. CASTING

1. Casting shall be East Jordan Iron Works casting #1020 & 1022 or approved equal.
2. Lid shall be stamped with the words "CITY OF GREENFIELD - SANITARY" or "CITY OF GREENFIELD - STORM".
3. Joint sealant under the casting shall be two rings of non-hardening butyl rubber rope, Conseal or equal. (Kent Seal is not acceptable)

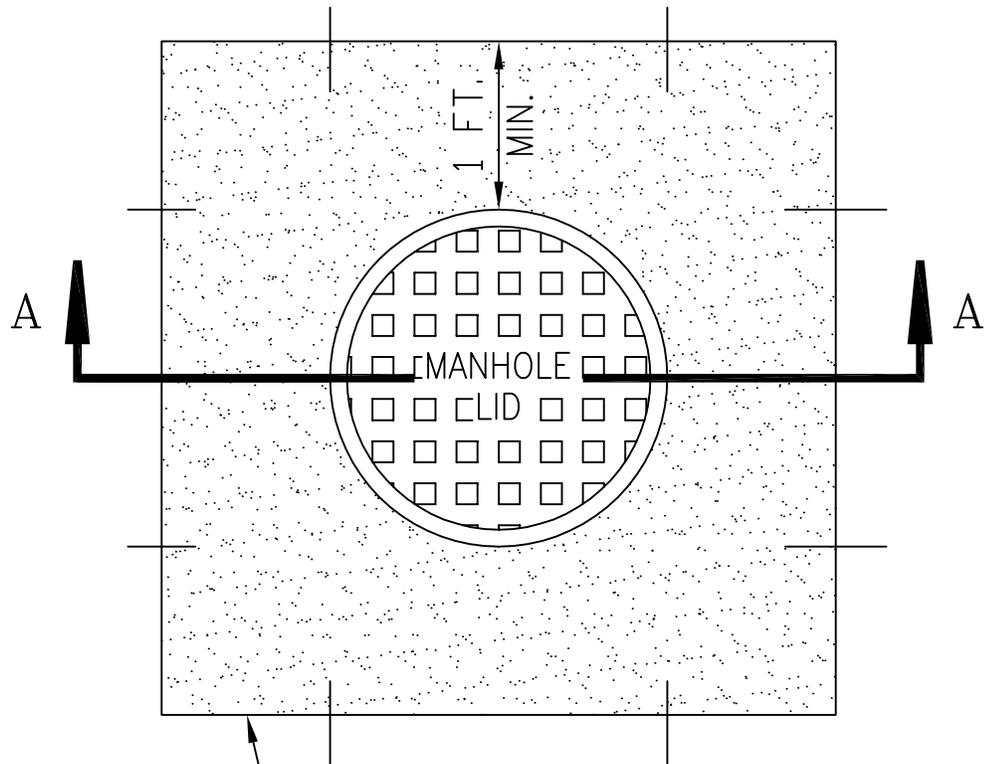
II. EXECUTION

A. TRAFFIC SAFETY

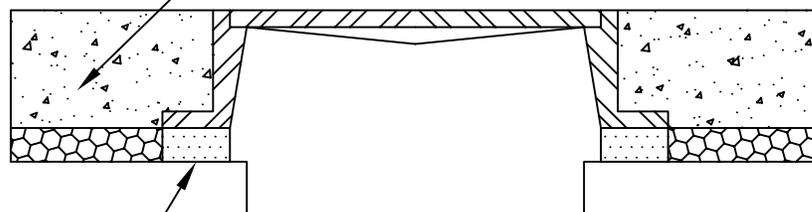
1. Road Closures are not allowed except when specifically approved by the City of Greenfield Police Department Traffic Safety Officer.
2. The Worksite Traffic Control Manual as published by I.D.O.T. shall be used as a guideline for establishing traffic control and safety measures for all road cuts and pavement repairs.
3. The worksite must be completely protected from vehicular and pedestrian traffic at all times. The use of Type II Barricades with flashing lights or drums with flashing lights is required.
4. All Traffic Control and Safety Equipment and sufficient personnel to erect and operate the equipment must be onsite before any construction in the Right-of-Way begins.

B. PERMIT REQUIRED

1. A Right Of Way Cut Permit is required before any work is performed in the City Right-of-Way.
2. The Right Of Way Cut Permit is issued by the City Engineers Office.



SAWCUT AND REMOVE EXISTING
CONCRETE AND REPLACE PER
CITY OF GREENFIELD
CONCRETE STREET CUT REPAIR
STANDARD DETAIL



CONCRETE ADJUSTMENT RINGS
SECTION "A-A"

CITY OF GREENFIELD

STANDARD DETAIL

Manhole Casting Adjustment in Concrete Street

Dwn.By: *D.Rodgers*

Origin Date: 01/05/99

Des. No: R-107-01

Rev. Date: 12/10/07

MANHOLE ADJUSTMENT IN CONCRETE STREET SPECIFICATIONS

I. MATERIALS

A. CONCRETE

1. Concrete shall be a High-Early-Strength mix capable of supporting vehicular traffic within 12 hours.
2. Concrete Material shall meet the requirements of Section 702 of the INDDOT Standard Specifications.
3. INDDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
4. The required thickness of the concrete patch is based on the Thoroughfare Designation as established by the Greenfield Comprehensive Plan.
5. J-Bars are required as shown in the drawing. Other types of load transfer joints may be approved prior to construction.

B. CASTING

1. Casting shall be East Jordan Iron Works casting #1020 & 1022 or approved equal.
2. Lid shall be stamped with the words "CITY OF GREENFIELD - SANITARY" or "CITY OF GREENFIELD - STORM".
3. Joint sealant under the casting shall be two rings of non-hardening butyl rubber rope, Conseal or equal. (Kent Seal is not acceptable)

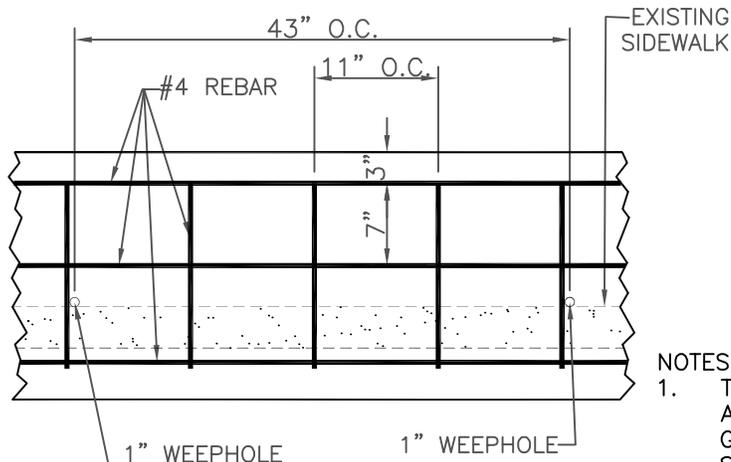
II. EXECUTION

A. TRAFFIC SAFETY

1. Road Closures are not allowed except when specifically approved by the City of Greenfield Police Department Traffic Safety Officer.
2. The Worksite Traffic Control Manual as published by I.D.O.T. shall be used as a guideline for establishing traffic control and safety measures for all road cuts and pavement repairs.
3. The worksite must be completely protected from vehicular and pedestrian traffic at all times. The use of Type II Barricades with flashing lights or drums with flashing lights is required.
4. All Traffic Control and Safety Equipment and sufficient personnel to erect and operate the equipment must be onsite before any construction in the Right-of-Way begins.

B. PERMIT REQUIRED

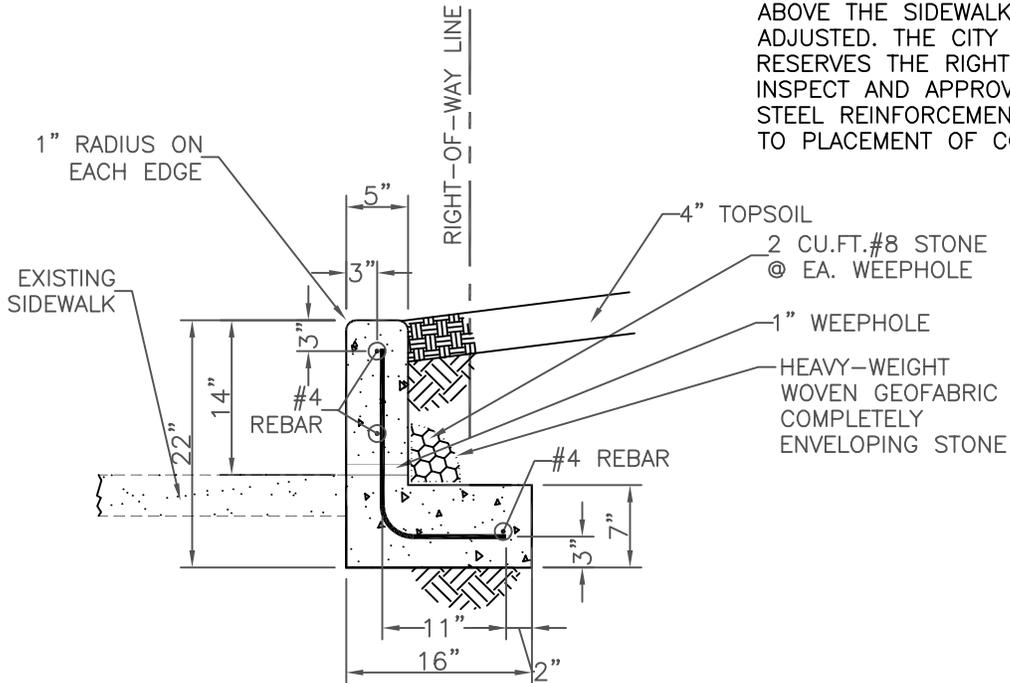
1. A Right Of Way Cut Permit is required before any work is performed in the City Right-of-Way.
2. The Right Of Way Cut Permit is issued by the City Engineers Office.



FRONT VIEW

NOTES:

1. THIS DETAIL SHALL BE USED AT ANY LOCATION IN THE CITY OF GREENFIELD WHERE NEW SIDEWALK CONSTRUCTION CREATES A SLOPE IN THE YARD AREA GREATER THAN 4:1.
2. THE HEIGHT OF THE WALL ABOVE THE SIDEWALK MAY BE ADJUSTED. THE CITY ENGINEER RESERVES THE RIGHT TO INSPECT AND APPROVE OF THE STEEL REINFORCEMENT PRIOR TO PLACEMENT OF CONCRETE.



SECTION

CITY OF GREENFIELD

STANDARD DETAIL

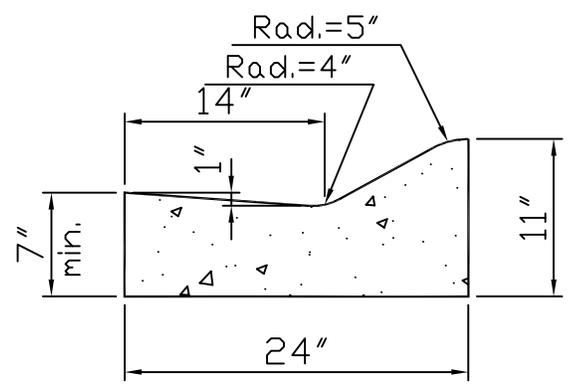
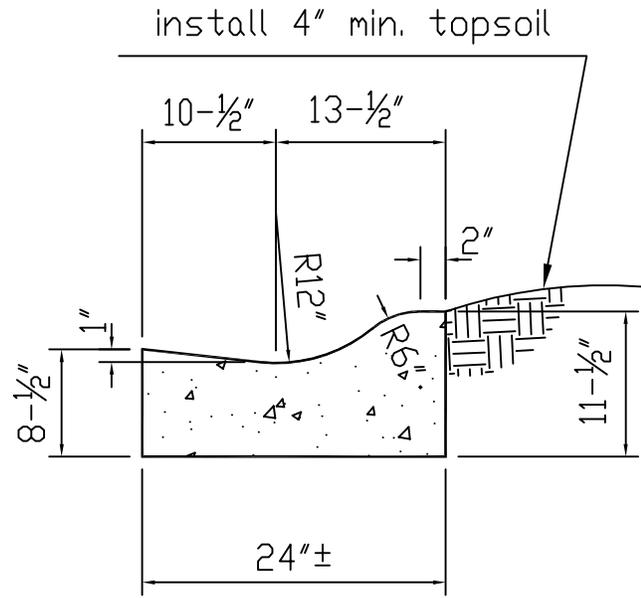
RETAINING WALL

Dwn.By: *D.Rodgers*

Origin Date: 11/04/97

Des. No: R-108-01

Rev. Date: 12/10/07



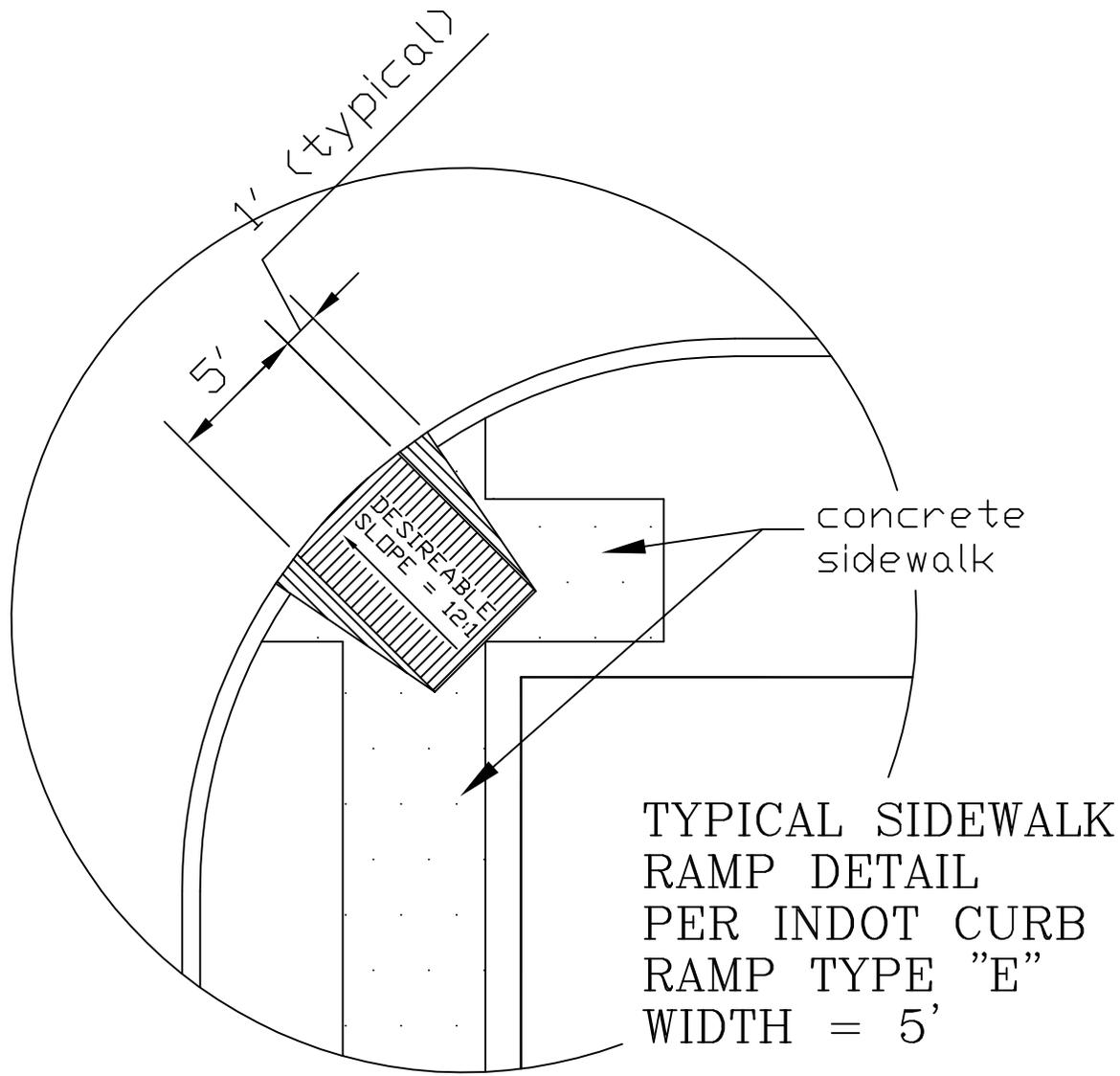
SECTION THROUGH CURB

Note: Either of the curb profile shown are acceptable, based on the geometry of the approved inlet casting used.

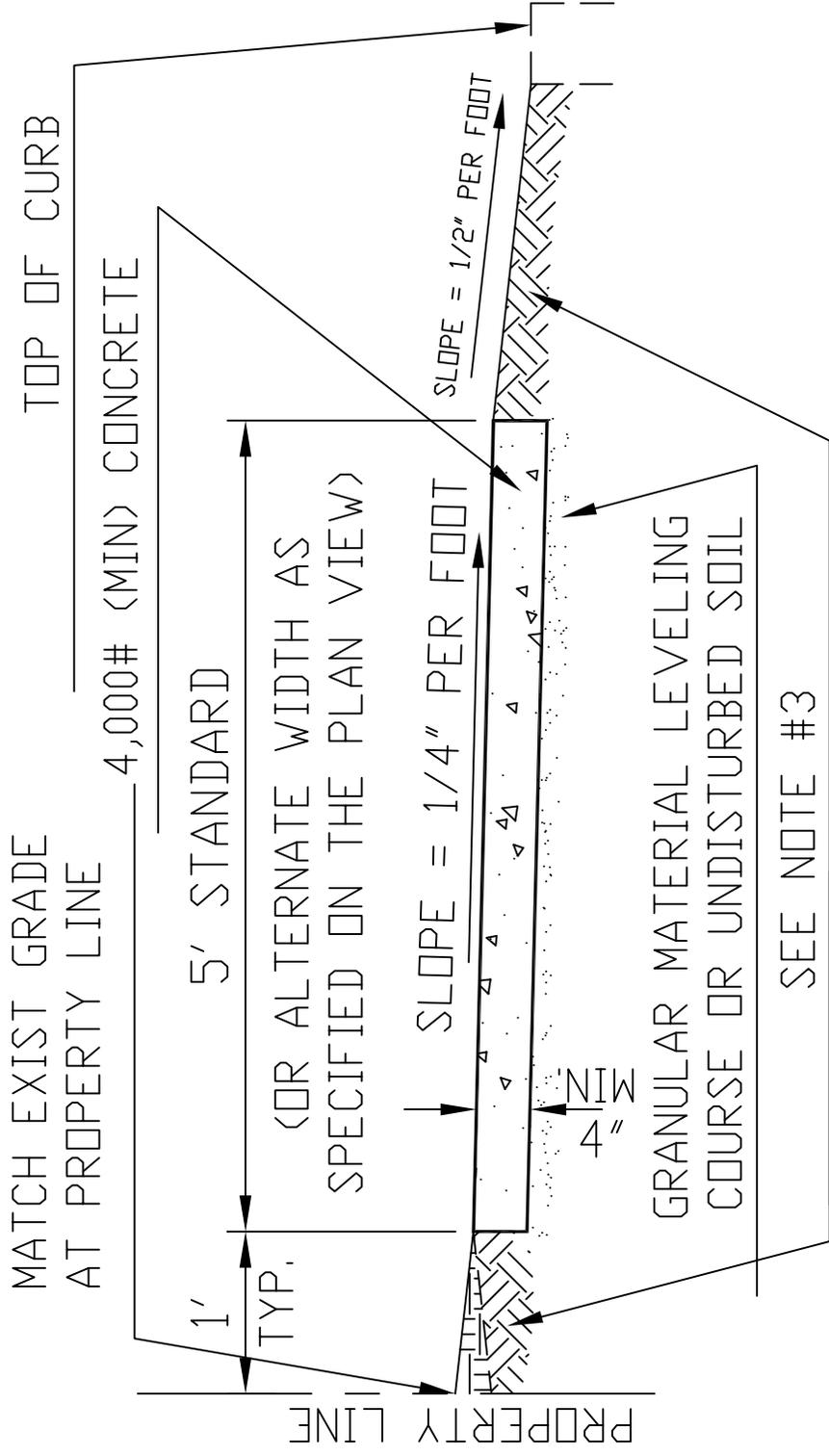
| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| ROLL CURB DETAIL | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 11/28/07 |
| Des. No: R-109-01 | Rev. Date: 12/10/07 |

CONSTRUCTION SPECIFICATIONS

1. Concrete Material shall meet the requirements of Section 702 of the Indiana Department of Transportation Standard Specifications.
2. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
3. Install topsoil, grass seed and mulch in all lawn areas disturbed by construction.
4. Sawcut existing pavement to a neat edge on any line where new construction meets existing pavement.
5. Provide tooled or sawn joints in concrete at 10 foot intervals.



| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| SIDEWALK RAMP DETAIL | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 11/30/07 |
| Des. No: R-110-01 | Rev. Date: 12/10/07 |



SECTION THROUGH SIDEWALK

CITY OF GREENFIELD

STANDARD DETAIL

STANDARD SIDEWALK DETAIL

Dwn.By: *D.Rodgers* Origin Date: 12/29/98

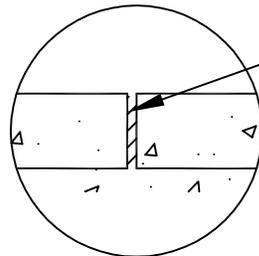
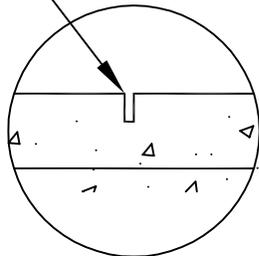
Des. No: R-111-01 Rev. Date: 12/10/07

CONSTRUCTION SPECIFICATIONS

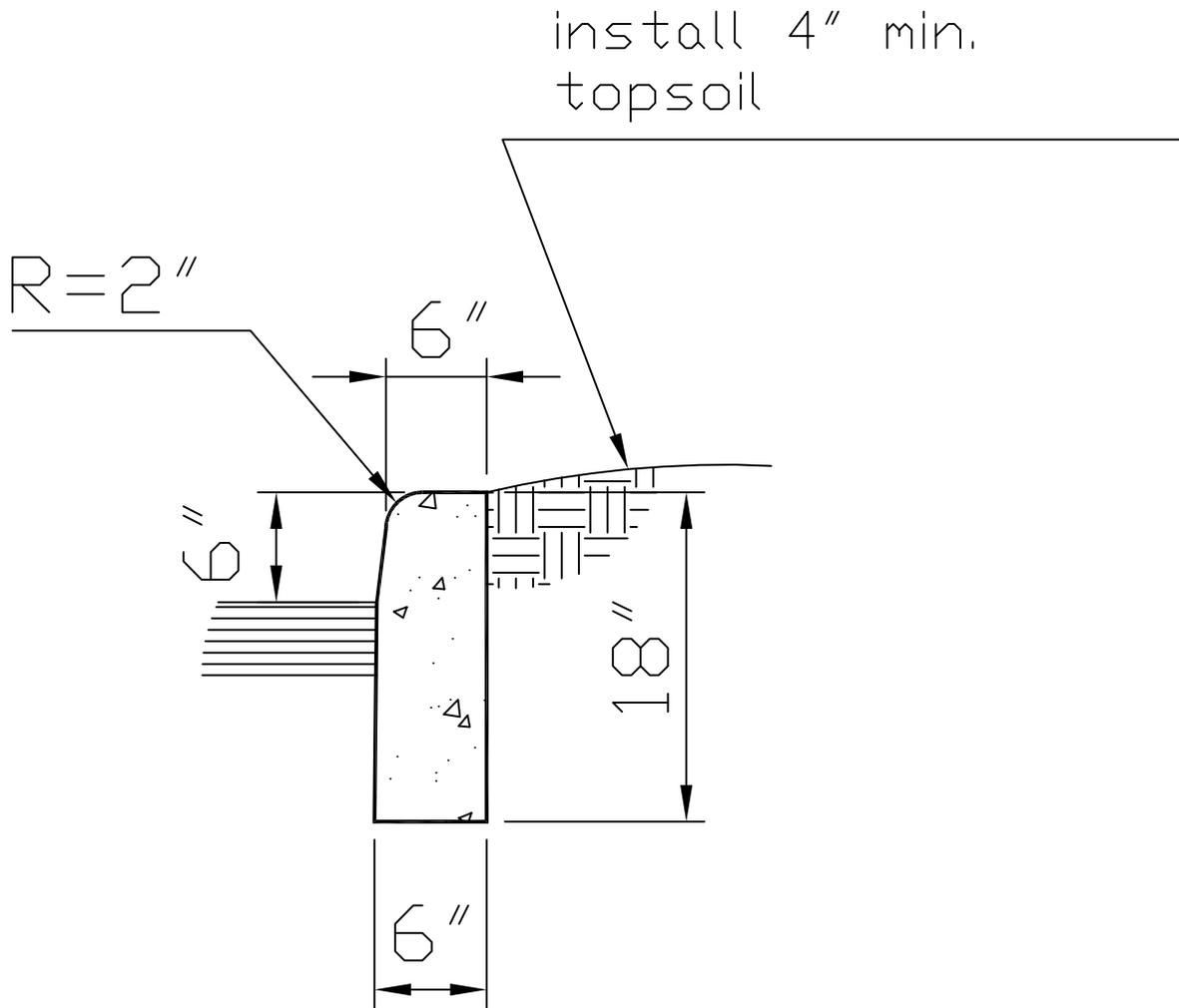
1. Concrete Material shall meet the requirements of Section 702 of the Indiana Department of Transportation Standard Specifications.
2. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
3. Install topsoil, grass seed and mulch in all lawn areas disturbed by construction.

1-1/2" deep tooled joint
every five feet (max)

commercially manufactured
joint filler material
installed every 50 feet (max)



JOINT DETAILS



SECTION THROUGH CURB

CITY OF GREENFIELD

STANDARD DETAIL

STRAIGHT CONCRETE CURB

Dwn.By: *D.Rodgers*

Origin Date: 12/29/98

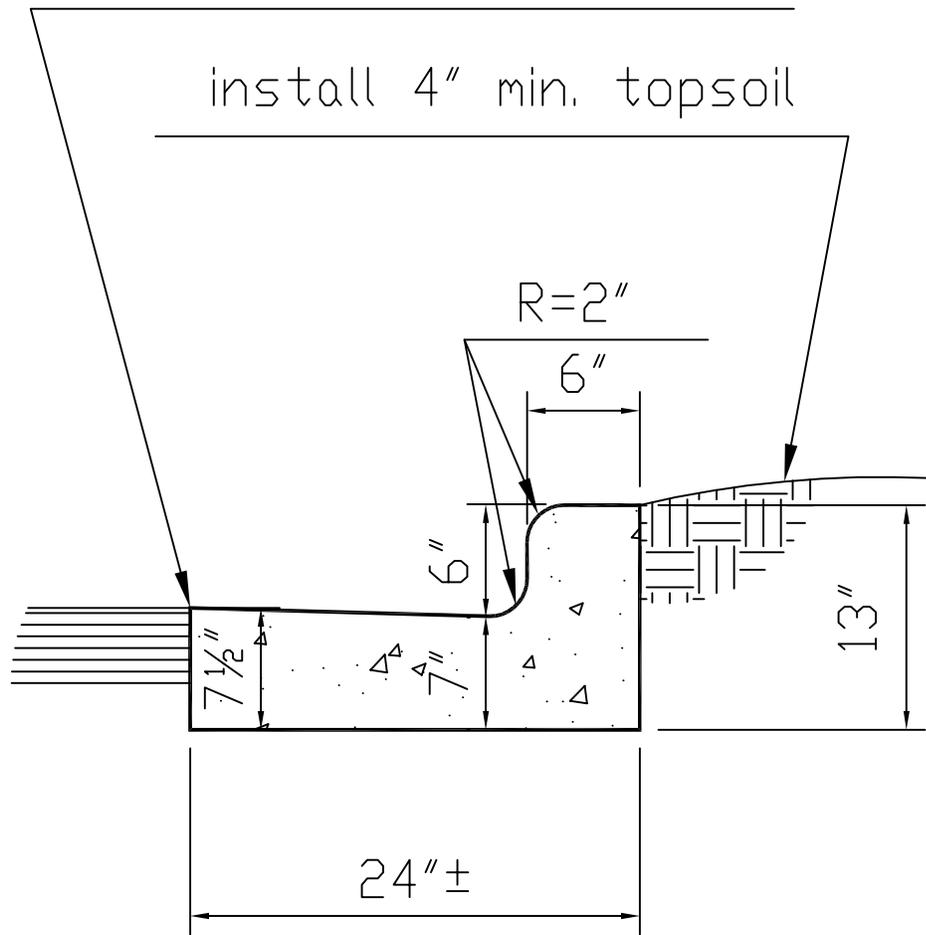
Des. No: R-112-01

Rev. Date: 12/10/07

CONSTRUCTION SPECIFICATIONS

1. Concrete Material shall meet the requirements of Section 702 of the Indiana Department of Transportation Standard Specifications.
2. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
3. Install topsoil, grass seed and mulch in all lawn areas disturbed by construction.
4. Sawcut existing pavement to a neat edge on any line where new construction meets existing pavement.
5. Provide tooled or sawn joints in concrete at 10 foot intervals.

sawcut existing pavement
to a neat edge and
install new concrete
gutter to match existing
asphalt at sawcut line

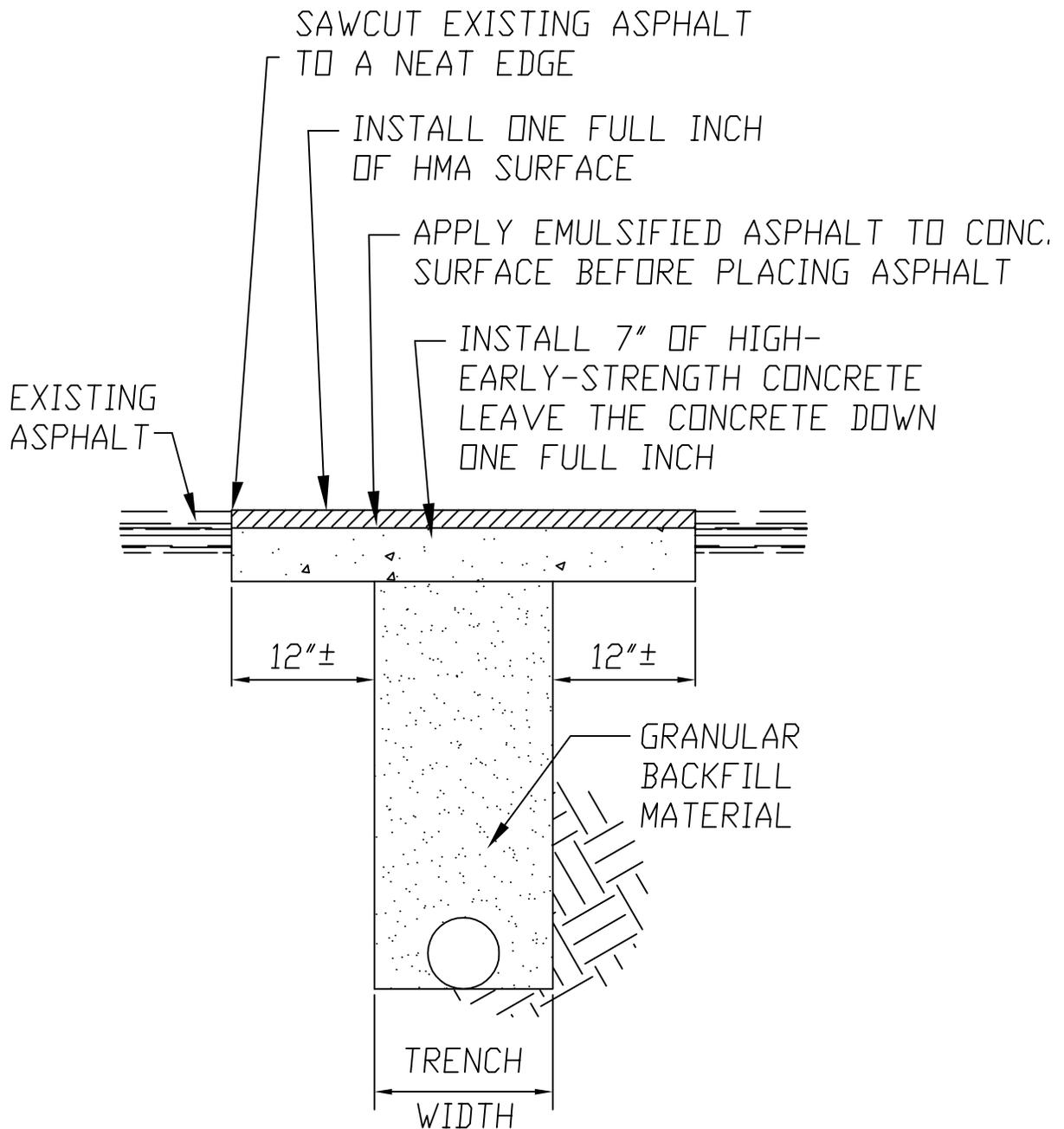


SECTION THROUGH CURB

| | |
|-----------------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| VERTICAL CURB & GUTTER | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 12/29/98 |
| Des. No: R-113-01 | Rev. Date: 12/10/07 |

CONSTRUCTION SPECIFICATIONS

1. Concrete Material shall meet the requirements of Section 702 of the Indiana Department of Transportation Standard Specifications.
2. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
3. Install topsoil, grass seed and mulch in all lawn areas disturbed by construction.
4. Sawcut existing pavement to a neat edge on any line where new construction meets existing pavement.
5. Provide tooled or sawn joints in concrete at 10 foot intervals.



NOTE: The one inch of asphalt surface shall be installed as soon as possible in the spring. The City will retain money to cover this cost.

CITY OF GREENFIELD

STANDARD DETAIL

Winter Season Street Cut Repair Detail

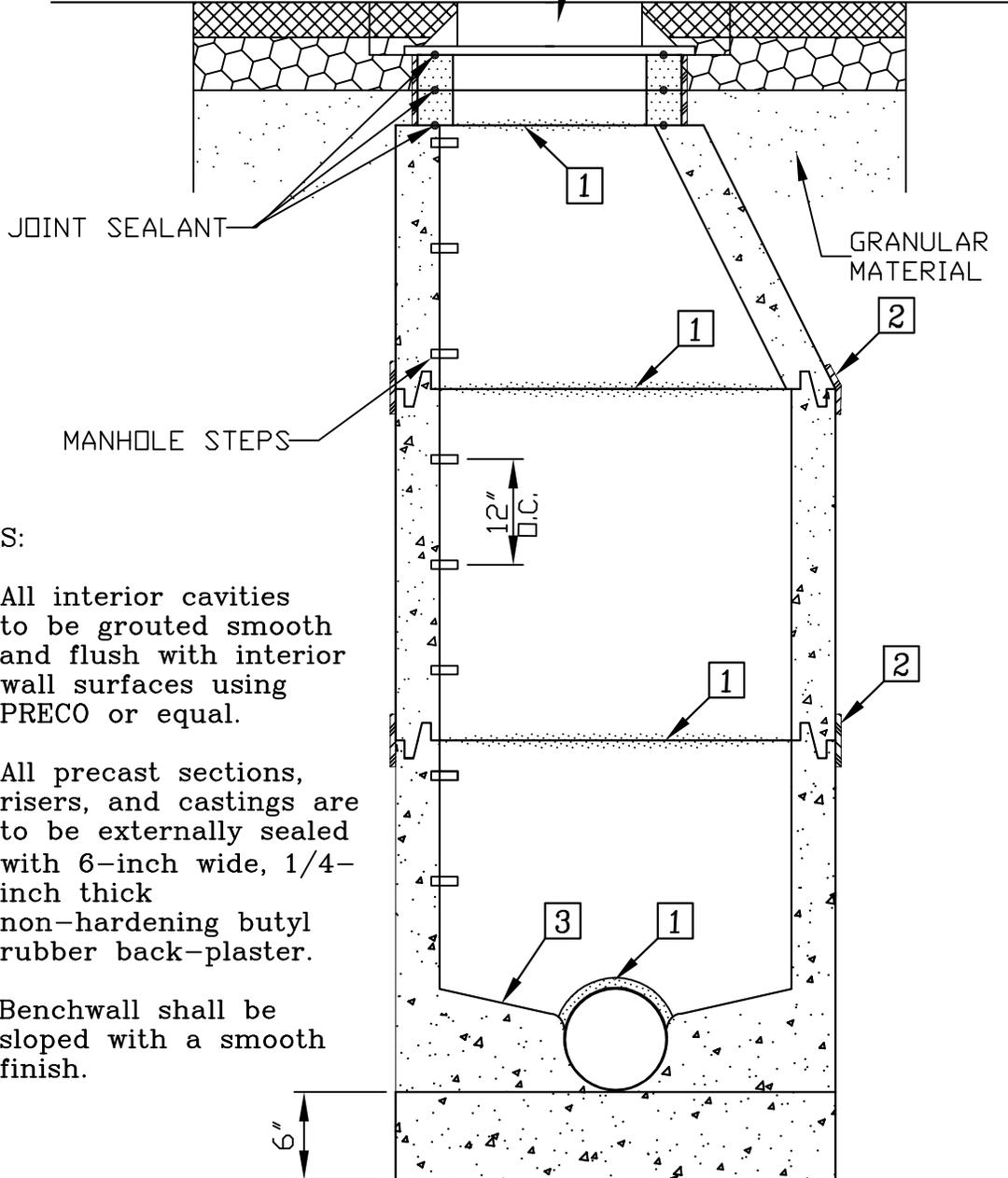
Dwn.By: *D.Rodgers*

Origin Date: 11/30/07

Des. No: R-114-01

Rev. Date: 12/10/07

EAST JORDAN IRON WORKS
 CASTING #1022 WITH GASKET LID
 (OR APPROVED EQUAL)
 WITH "CITY OF GREENFIELD
 SANITARY" CAST IN LID



NOTES:

- 1 All interior cavities to be grouted smooth and flush with interior wall surfaces using PRECO or equal.
- 2 All precast sections, risers, and castings are to be externally sealed with 6-inch wide, 1/4-inch thick non-hardening butyl rubber back-plaster.
- 3 Benchwall shall be sloped with a smooth finish.

| | |
|-------------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| SANITARY SEWER MANHOLE | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 01/04/99 |
| Des. No: SN-115-02 | Rev. Date: 08/01/08 |

SANITARY SEWER MANHOLE SPECIFICATIONS

I. MATERIALS

A. CASTING

1. Casting shall be East Jordan Iron Works casting 1022 or approved equal with Gasketed Lid.
2. Lid shall be stamped with the words "CITY OF GREENFIELD – SANITARY".
3. A minimum of 4" and a maximum of 12" of concrete adjustment rings shall be installed under the casting.
4. Joint sealant under the casting, between the adjustment rings and between the adjustment rings and the manhole shall be two rings of non-hardening butyl rubber rope, Conseal or equal. (Kent Seal is not acceptable)

B. CONCRETE MANHOLE

1. 48" diameter precast concrete sections shall be used to construct the manhole barrel.
2. A flat-top may not be used in place of a cone section unless specifically approved by City Officials before construction begins.
3. All openings for sewers entering and leaving the manhole shall be core-drilled and fitted with a resilient, watertight connector.
4. All joints shall be fully sealed and watertight. The use of a rubber gasket is required.
5. The steps shall be made of plastic-coated steel and shall be placed as shown on the drawing.
6. The invert must be constructed as shown on the drawing.
7. Lateral Taps into manholes are not allowed.

C. BEDDING AND BACKFILL

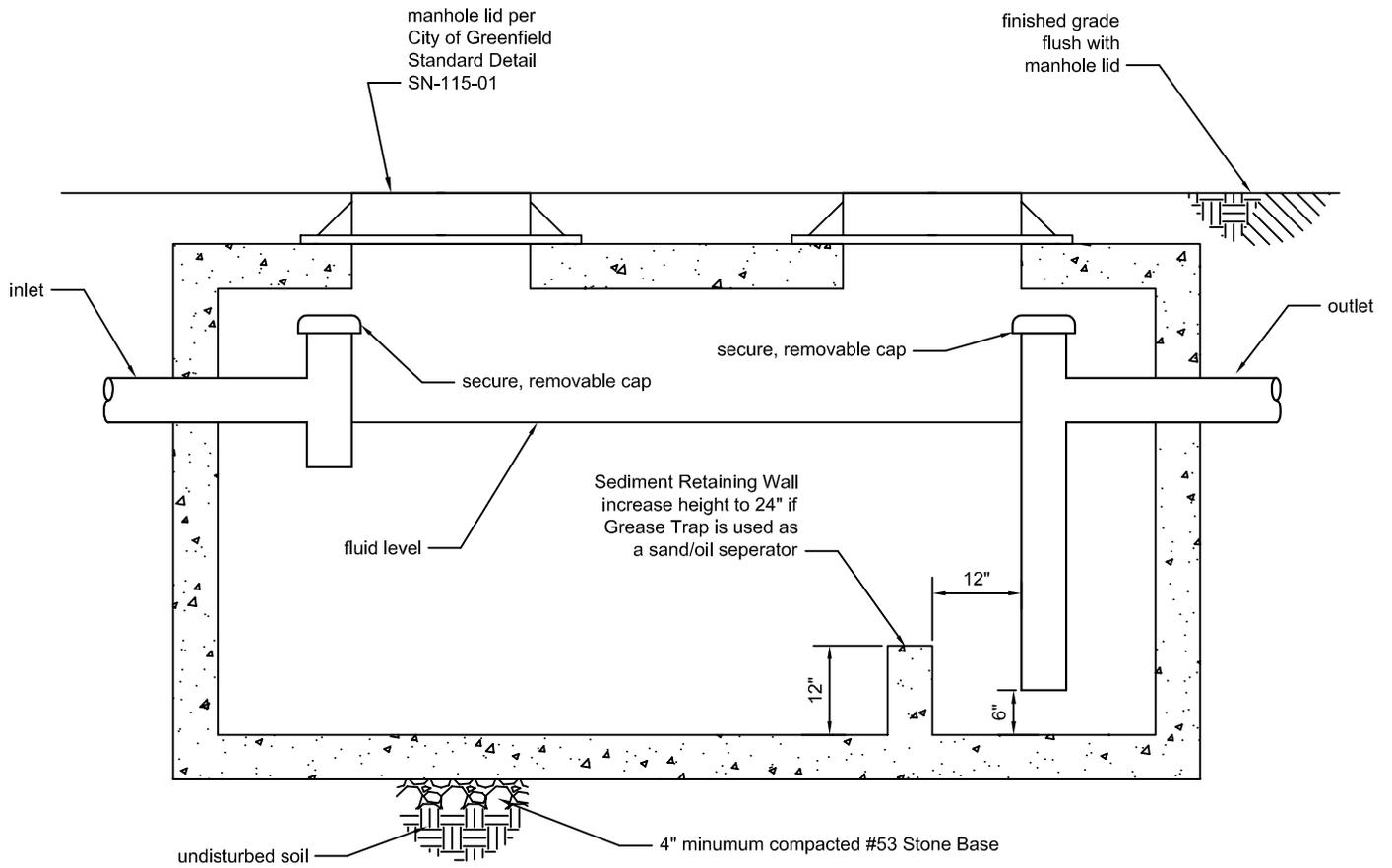
1. The manhole must be constructed directly upon undisturbed soil or a minimum of 6" of compacted crushed stone.
2. Granular material must be used to backfill the excavation. The material must be mechanically compacted in lifts not to exceed 12".

II. EXECUTION

A. INSPECTIONS

1. The manhole must be inspected by the Wastewater Treatment and Collections Department designated Inspector before the excavation is backfilled.

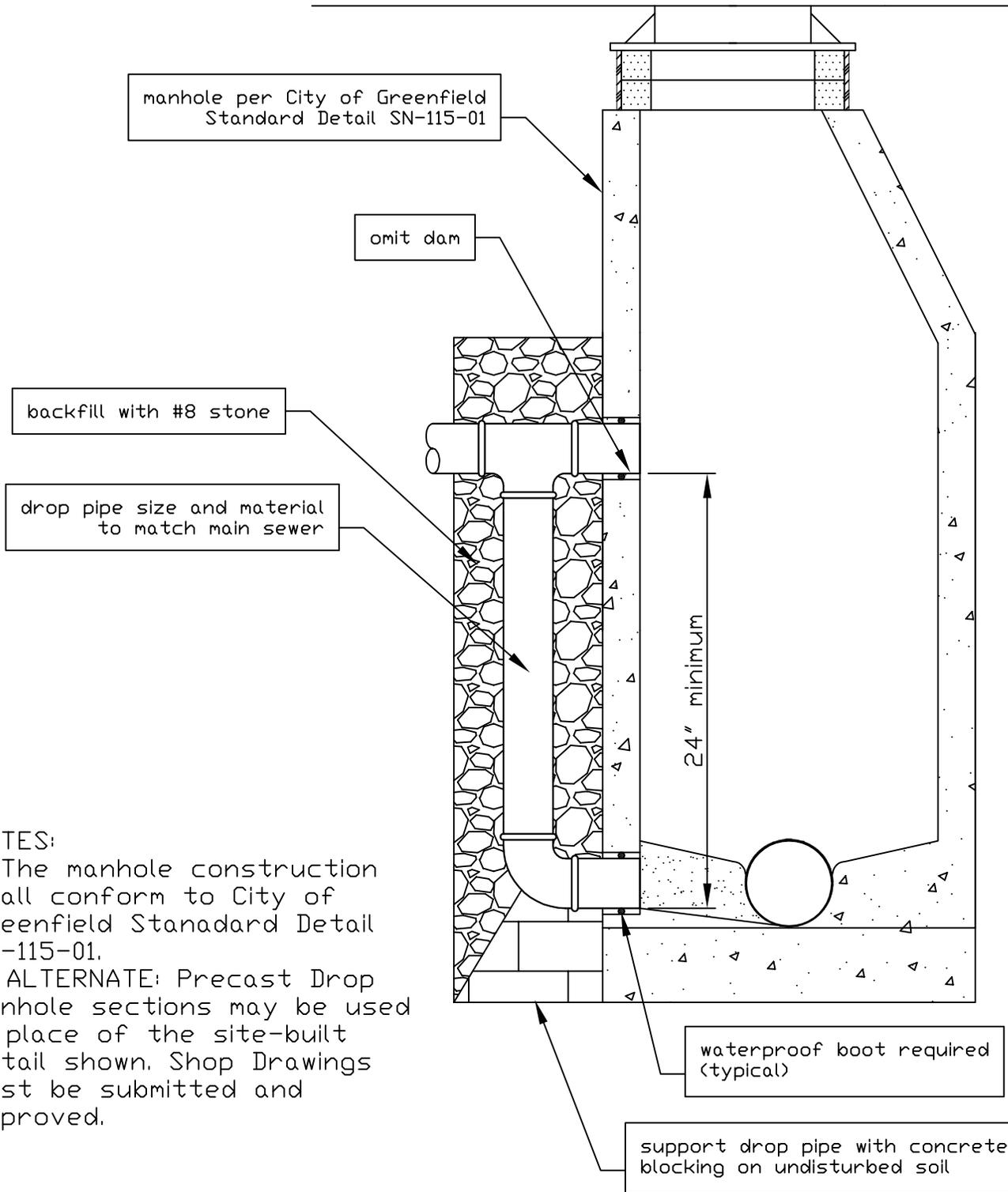
Call 477-4360



NOTES:

1. To facilitate cleaning, manhole lid openings must not be obstructed by the inlet or discharge piping assemblies.
2. This structure must be designed to withstand H2O loading conditions.

| | |
|-------------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| Commercial Grease Trap | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 09/04/08 |
| Des. No: SN-134 | Rev. Date: |

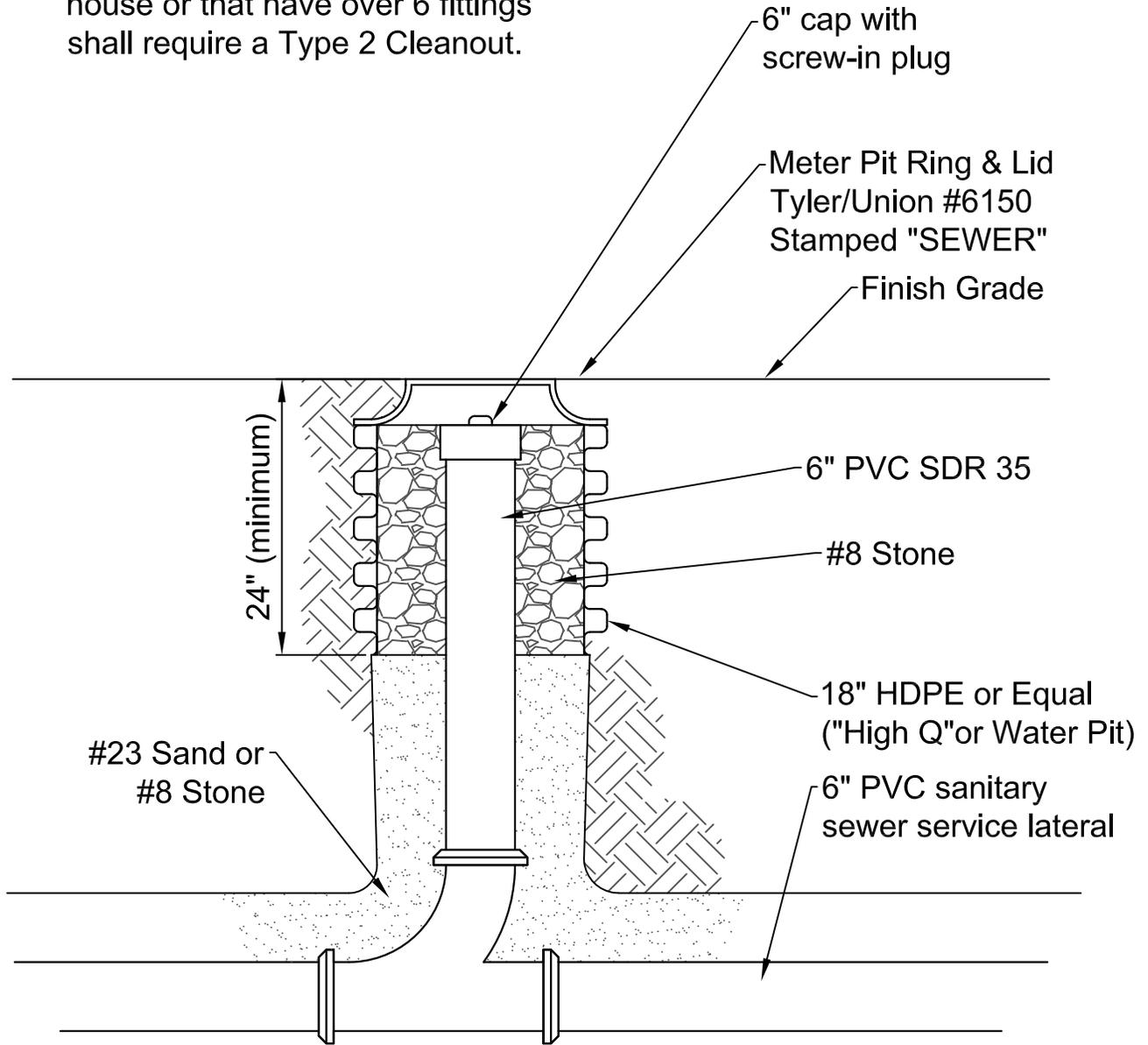


NOTES:

1. The manhole construction shall conform to City of Greenfield Standard Detail SN-115-01.
2. ALTERNATE: Precast Drop Manhole sections may be used in place of the site-built detail shown. Shop Drawings must be submitted and approved.

| | |
|------------------------------------|-------------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| SANITARY SEWER DROP MANHOLE | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 09/16/2008 |
| Des. No: SN-135 | Rev. Date: |

Laterals that are over 100 feet in length between the main and the house or that have over 6 fittings shall require a Type 2 Cleanout.



CITY OF GREENFIELD

STANDARD DETAIL

CLEAN-OUT TYPE 2

Dwn.By: *D.Rodgers*

Origin Date: 10/31/08

Des. No: SN-136

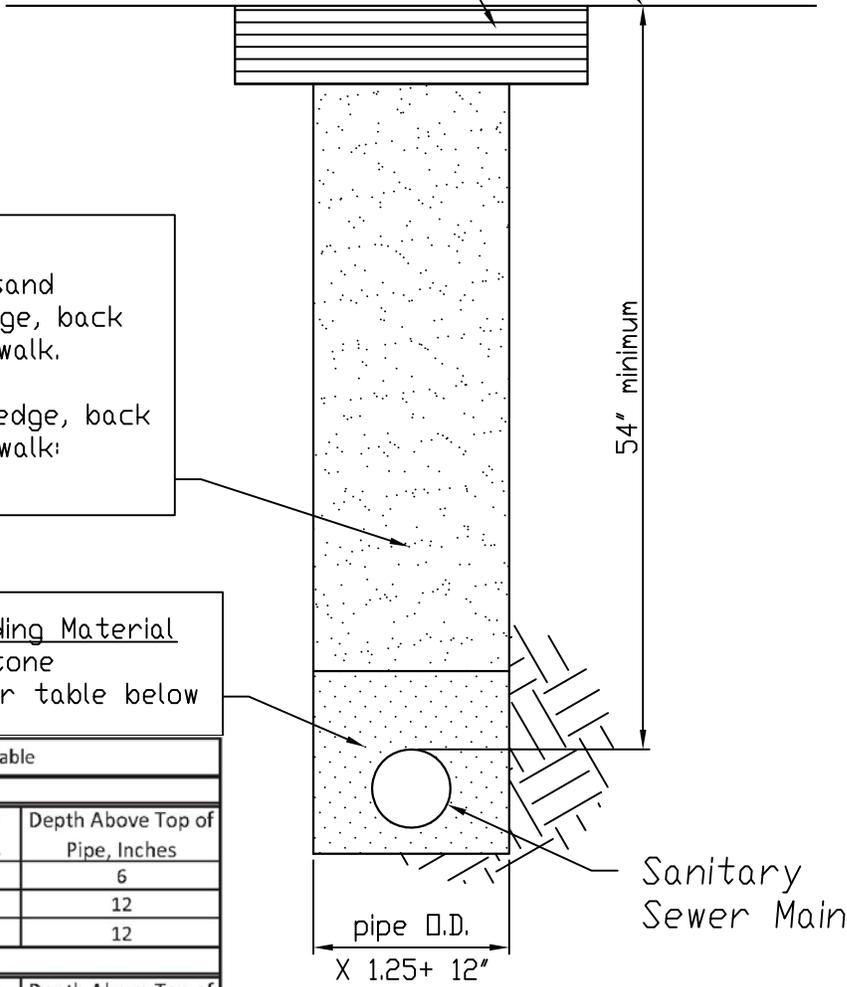
Rev. Date:

finish grade
 pavement repair per
 COG Std. Dtl R-101-01
 or R-102-01 if applicable

Backfill Material
 install #8 Stone or #24 sand
 within 5 feet of pvmt. edge, back
 of curb, or back of sidewalk.
 Install Clean Fill Material
 outside 5 feet of pvmt. edge, back
 of curb, or back of sidewalk:

Pipe Bedding Material
 #8 Limestone
 depth per table below

| Pipe Bedding Table | | |
|--------------------------------|----------------------------|---------------------------------|
| Flexible (PVC) Pipe | | |
| Pipe Size, Inches | Depth Below Barrel, Inches | Depth Above Top of Pipe, Inches |
| 6 or less | 4 | 6 |
| 8 to 15 | 4 | 12 |
| 18 and larger | 8 | 12 |
| Semi-Rigid (Ductile Iron) Pipe | | |
| Pipe Size, Inches | Depth Below Barrel, Inches | Depth Above Top of Pipe, Inches |
| 8 to 15 | 4 | 6 |
| 18 and larger | 8 | 6 |

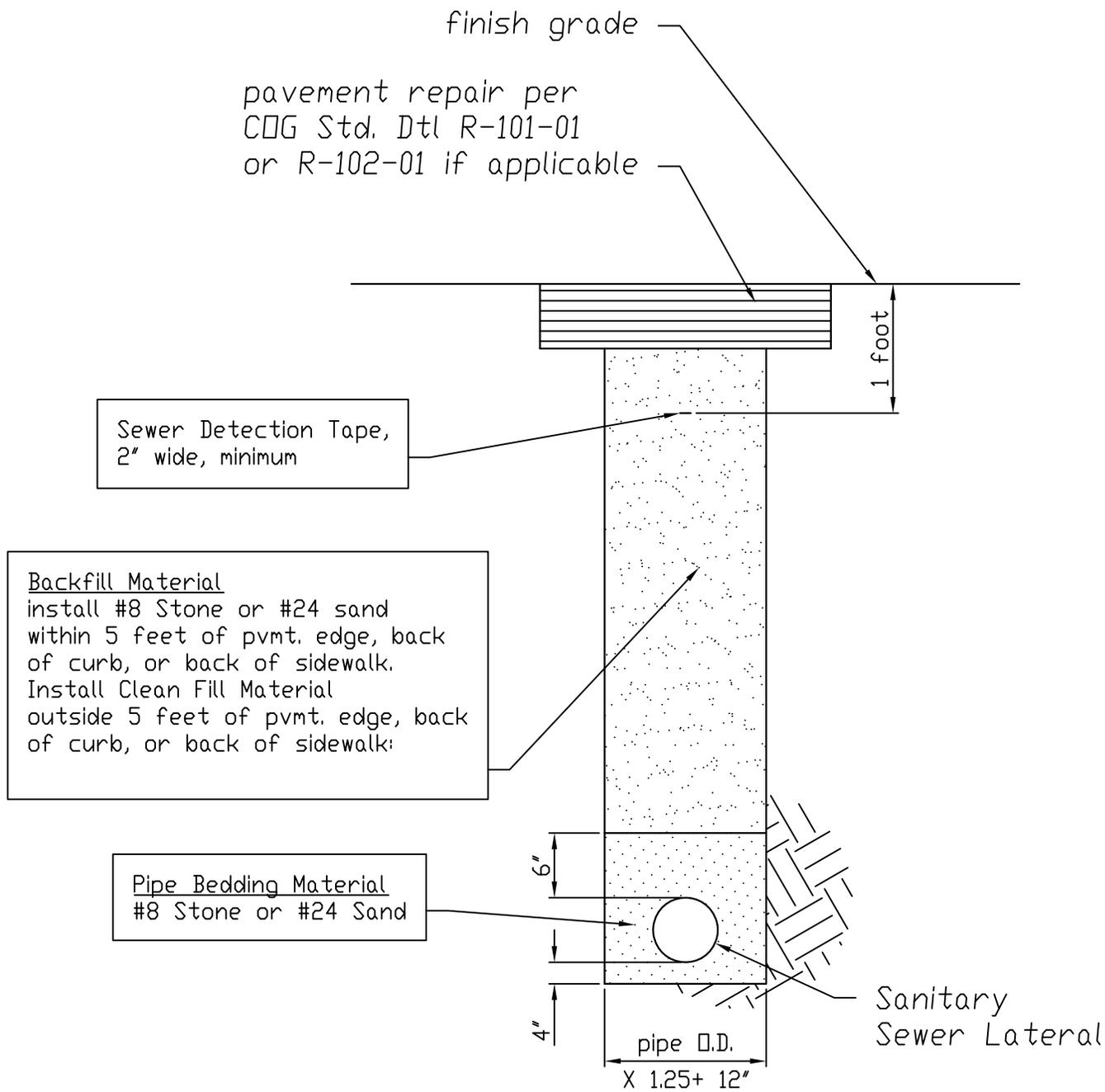


CITY OF GREENFIELD

STANDARD DETAIL

Mainline Sewer Backfill and Bedding

| | |
|--------------------------|------------------------|
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 1/12/2016 |
| Des. No: SN-137 | Rev. Date: |



CITY OF GREENFIELD

STANDARD DETAIL

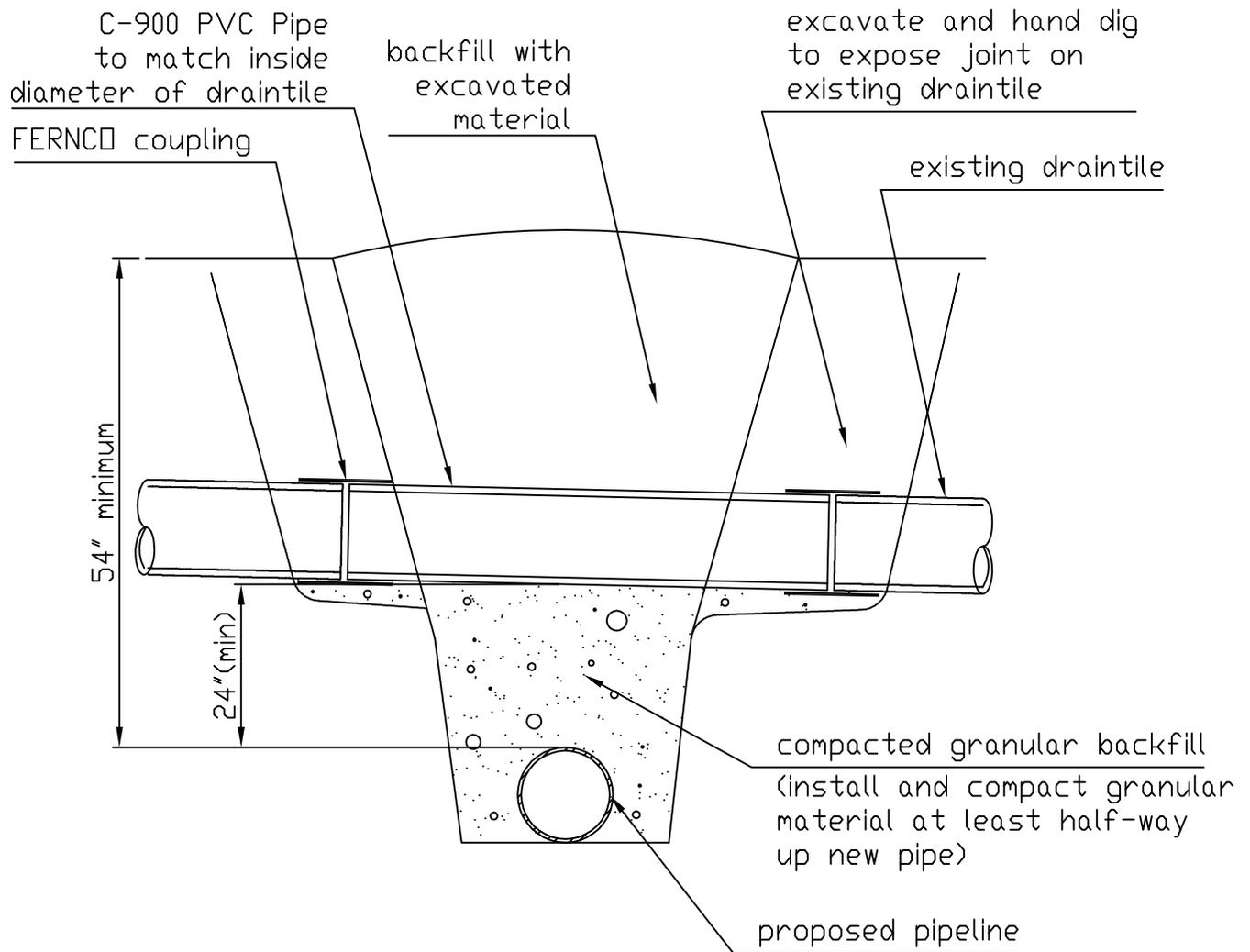
Sewer Lateral Backfill and Bedding

Dwn.By: *D.Rodgers*

Origin Date: 1/13/2016

Des. No: SN-138

Rev. Date:



CROSSING
DETAIL

CITY OF GREENFIELD

STANDARD DETAIL

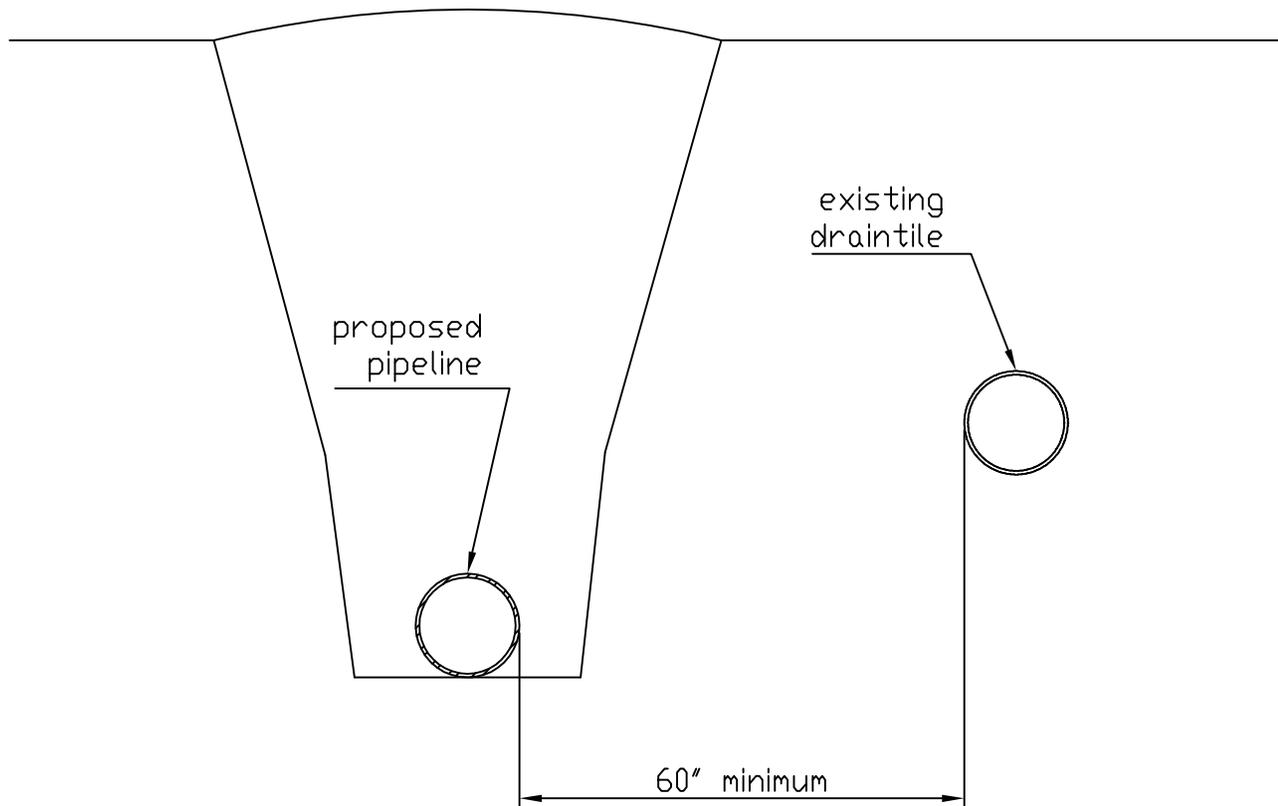
Hancock County Legal Court Drain tile crossing

Dwn.By: *D.Rodgers*

Origin Date: 01/05/99

Des. No: ST-116-01

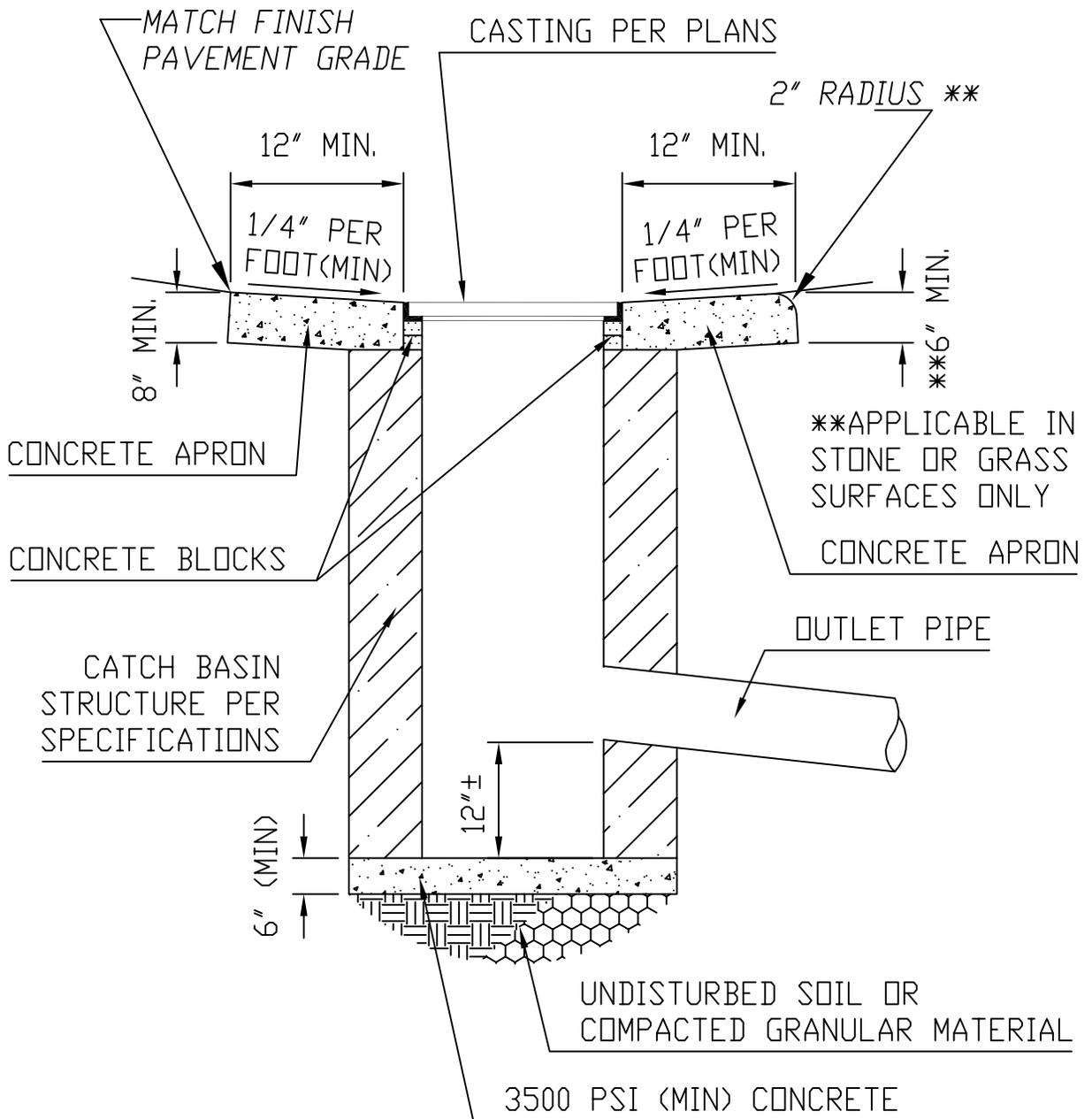
Rev. Date: 12/10/07



HORIZONTAL SEPARATION DETAIL

NOTES:

1. Any substitutions for the materials as shown on this detail must be approved by the Greenfield City Engineering Department.
2. The location of all draintile crossings must be recorded on the "As-Built" plans.
3. This Detail applies to construction within any Hancock County Legal Court Drain.



CITY OF GREENFIELD

STANDARD DETAIL

STORM SEWER CATCH BASIN

Dwn.By: *D.Rodgers*

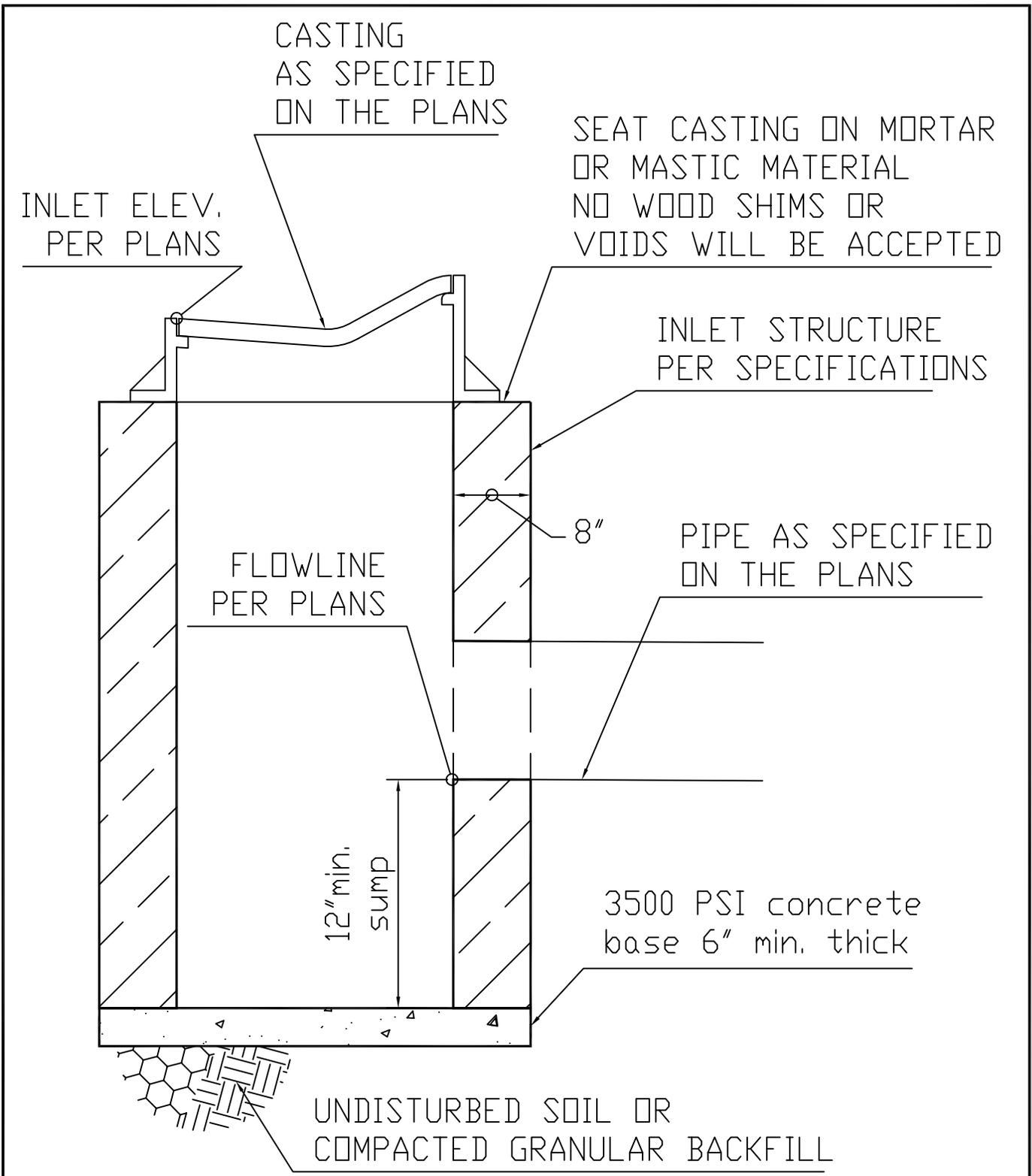
Origin Date: 01/30/07

Des. No: ST-117-01

Origin Date: 12/10/07

CATCH BASIN CONSTRUCTION SPECIFICATIONS

1. The following materials are acceptable for catch basin construction:
 - A. Precast or Cast-in-place concrete may be used with the following stipulations:
 - a. The concrete must be at least 6 inches thick
 - b. The top 6 inches (minimum) of structure must be constructed of solid concrete blocks.
2. Construct Poured Concrete Base as shown in the drawing.
3. Concrete Material shall meet the requirements of Section 702 of the Indiana Department of Transportation Standard Specifications.
4. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
5. The inside dimensions of the structure shall match the opening dimensions of the casting. The entire flange of the casting shall bear upon the top of the structure.
6. All voids around the pipe shall be filled with non-shrink grout and shall be smooth and flush with the inside wall surfaces. The construction shall be watertight.
7. All Inlet castings must be pre-stamped with an appropriate "clean water" message.

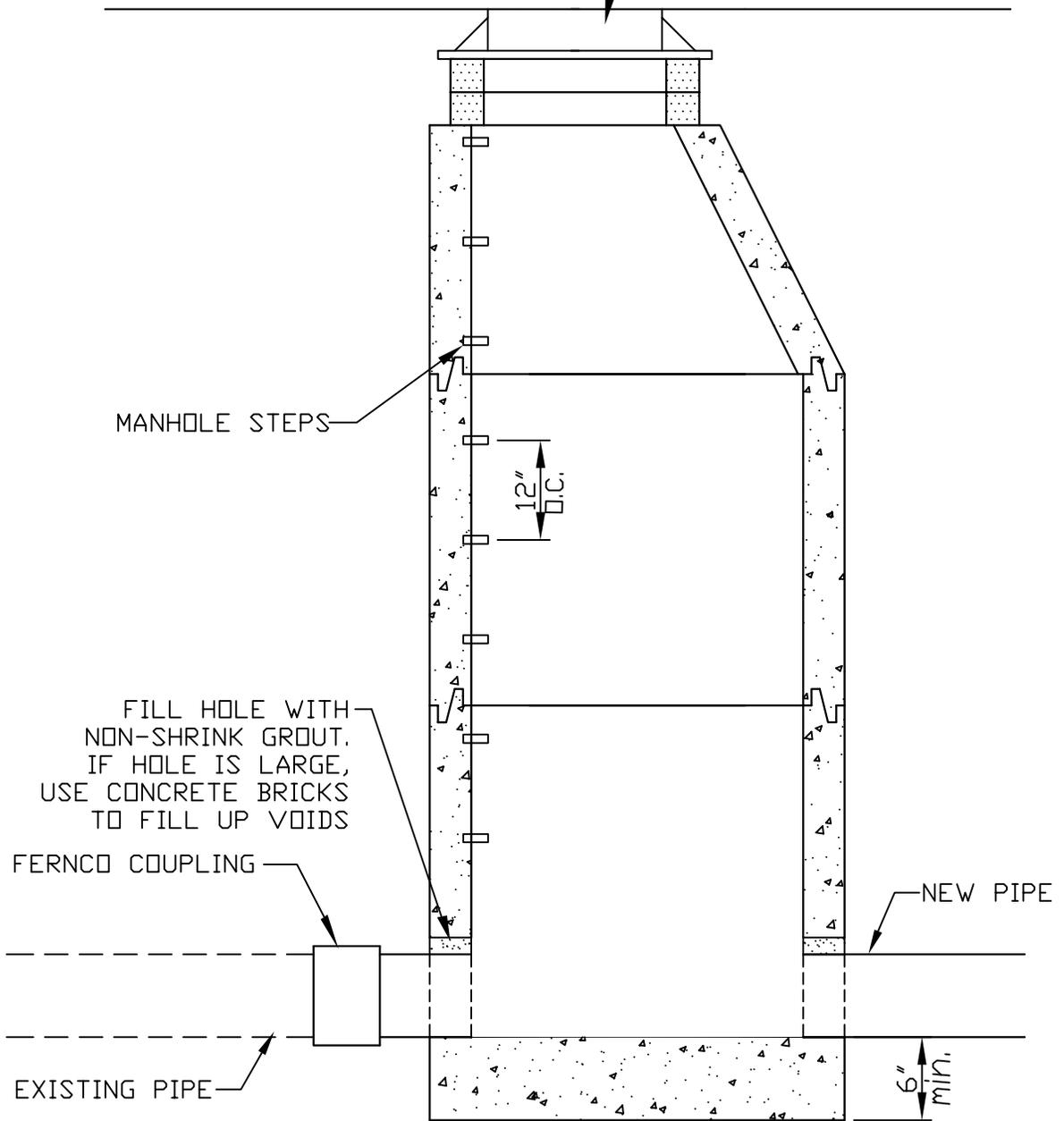


| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| STORM SEWER INLET | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 01/30/07 |
| Des. No: ST-118-01 | Rev. Date: 12/10/07 |

INLET CONSTRUCTION SPECIFICATIONS

1. The following materials are acceptable for inlet construction:
 - A. Precast or Cast-in-place concrete may be used with the following stipulations:
 - a. Concrete must be at least 6 inches thick
 - b. Top 6 inches (minimum) of structure must be constructed of solid concrete blocks.
2. Construct Poured Concrete Base as shown in the drawing.
3. Concrete Material shall meet the requirements of Section 702 of the Indiana Department of Transportation Standard Specifications.
4. INDOT Standard Specifications Section 501.10 Limitations of Mixing shall govern the placement of concrete in cold weather.
5. The inside dimensions of the structure shall match the opening dimensions of the casting. The entire flange of the casting shall bear upon the top of the structure.
6. All voids around the pipe shall be filled with non-shrink grout and shall be smooth and flush with the inside wall surfaces. The construction shall be watertight.
7. All inlet castings must be pre-stamped with an appropriate "clean-water" message.

EAST JORDAN IRON WORKS CASTING #1020
 (OR APPROVED EQUAL)
 WITH "CITY OF GREENFIELD
 STORM" CAST IN LID



CITY OF GREENFIELD

STANDARD DETAIL

STORM SEWER MANHOLE

Dwn.By: *D.Rodgers*

Origin Date: 01/30/07

Des. No: ST-119-01

Rev. Date: 12/10/07

STORM SEWER MANHOLE SPECIFICATIONS

I. MATERIALS

A. CASTING

1. Casting shall be East Jordan Iron Works casting #1020 or approved equal.
2. Lid shall be stamped with the words "CITY OF GREENFIELD - STORM" and an appropriate "clean water" message.
3. A minimum of 4" and a maximum of 12" of concrete adjustment rings shall be installed under the casting.
4. Joint sealant under the casting, between the adjustment rings and between the adjustment rings and the manhole shall be two rings of non-hardening butyl rubber rope, Conseal or equal. (Kent Seal is not acceptable)

B. CONCRETE MANHOLE

1. 48" diameter precast concrete sections shall be used to construct the manhole barrel.
2. A flat-top may not be used in place of a cone section unless specifically approved by City Officials before construction begins.
3. "O-ring" gaskets must be used in the joints between manhole sections.
4. The finished manhole must be watertight.
5. The steps shall be made of plastic-coated steel and shall be placed as shown on the drawing.

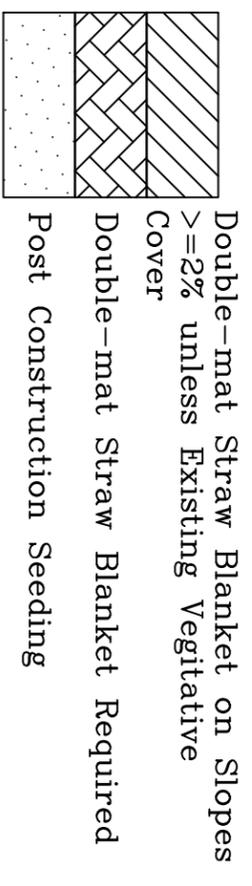
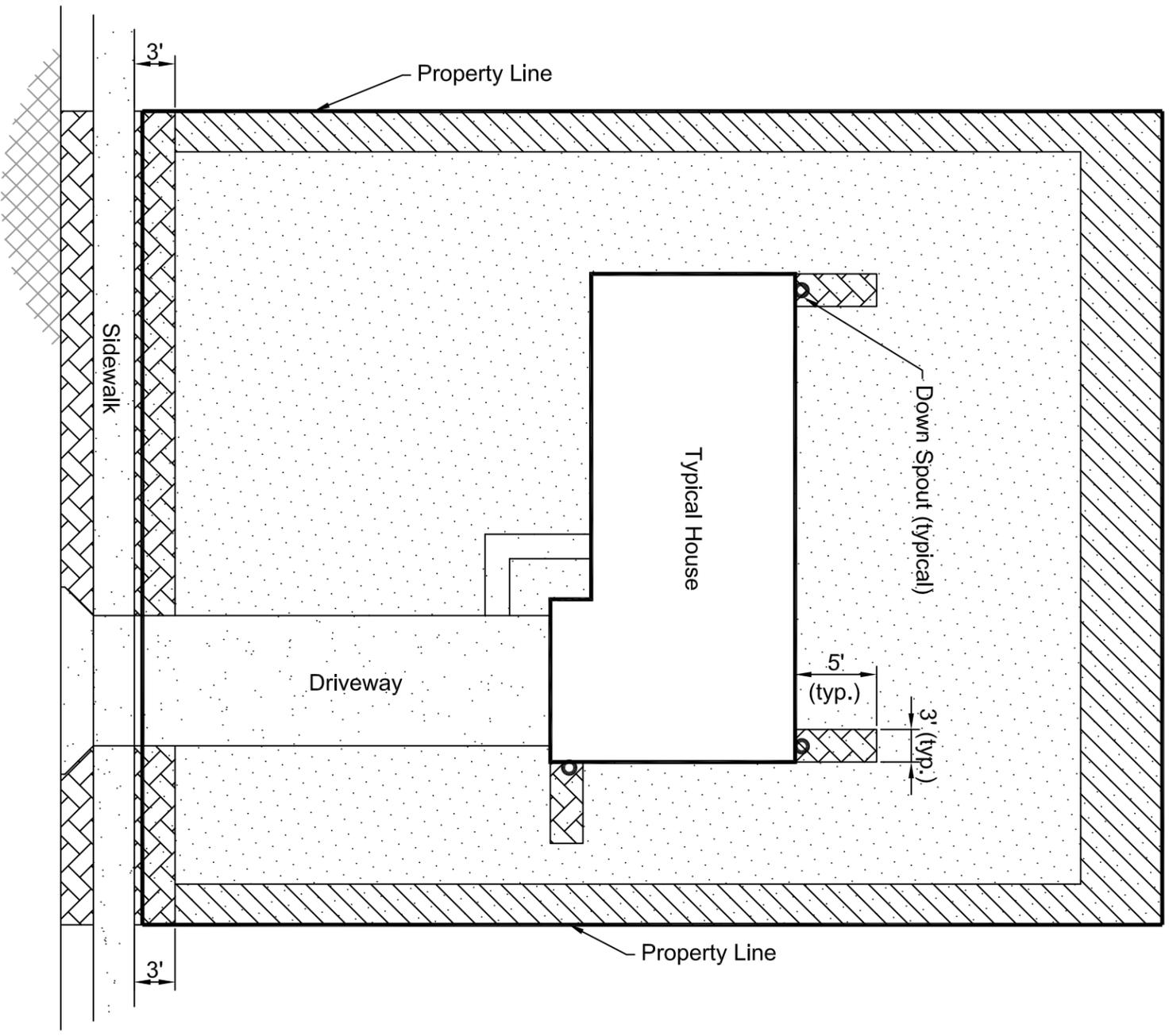
C. BEDDING AND BACKFILL

1. The manhole must be constructed directly upon undisturbed soil or a minimum of 6" of compacted crushed stone.
2. Granular material must be used to backfill the excavation. The material must be mechanically compacted in lifts not to exceed 12".

II. EXECUTION

A. INSPECTIONS

1. The manhole must be inspected by the Wastewater Treatment and Collections Department designated Inspector before the excavation is backfilled.



Notes:

1. Post Construction Seeding may be accomplished by Hydroseeding at a wood fiber or cellulose rate of 1 ton per acre or by seeding with straw mulch at a rate of 2 tons per acre.
2. Post construction permanent seeding shall be at a rate consistent with chapter 7 of the Indiana storm water quality manual. In the absence of site specific soil testing, the seed bed preparation shall include the application of a fertilizer at a rate of 400 to 600 pounds per acre of 12-12-12 analysis fertilizer.
3. The application of SOD will satisfy seeding and mulching requirements in areas where SOD is laid.
4. Additional stabilization may be required in site specific concentrated flow areas.

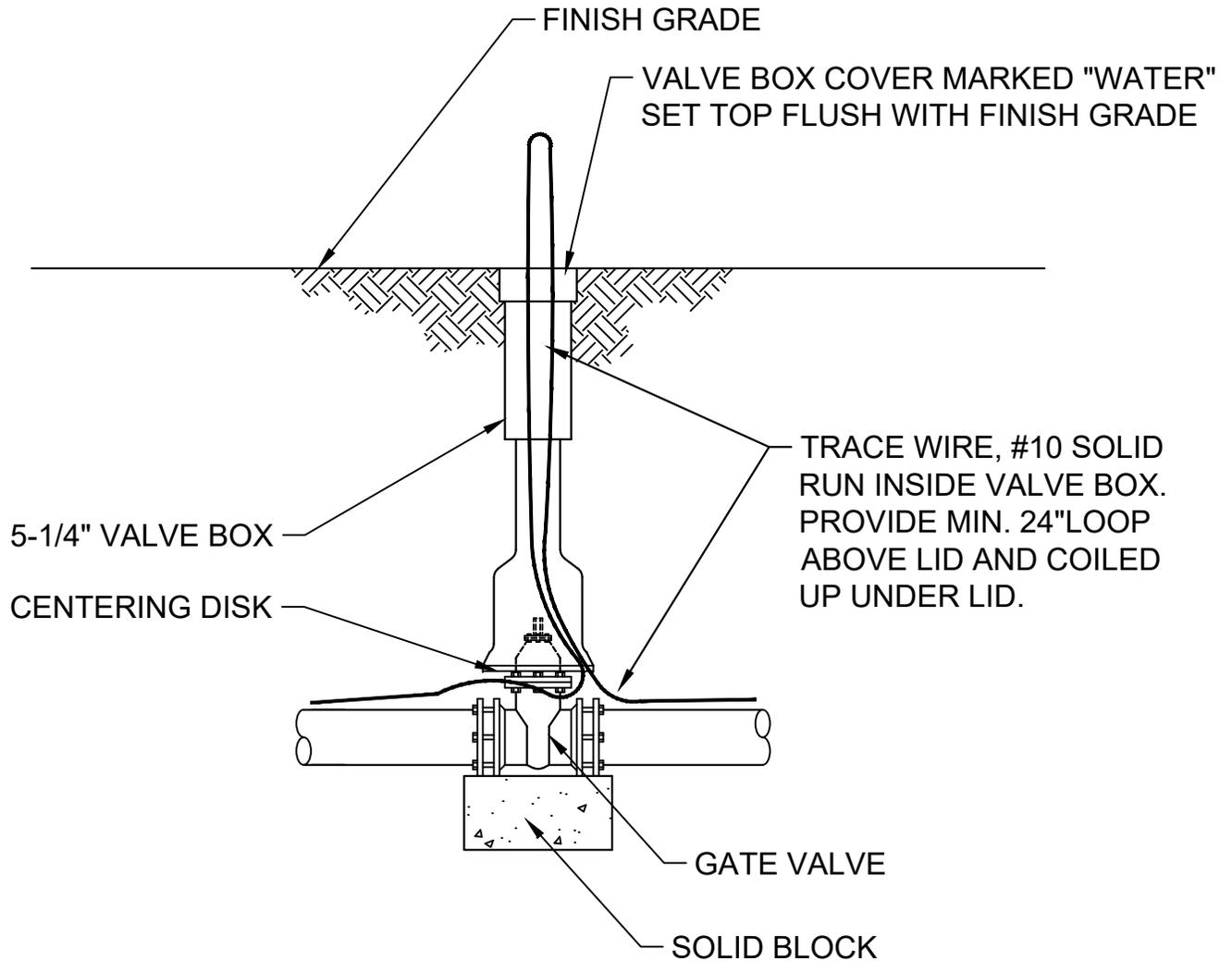
CITY OF GREENFIELD

STANDARD DETAIL

Individual Lot Post-Construction Sediment Control Plan

Dwn.By: *D.Rodgers* Origin Date: 09/15/2014

Des. No: ST-141-00 Rev. Date:



CITY OF GREENFIELD

STANDARD DETAIL

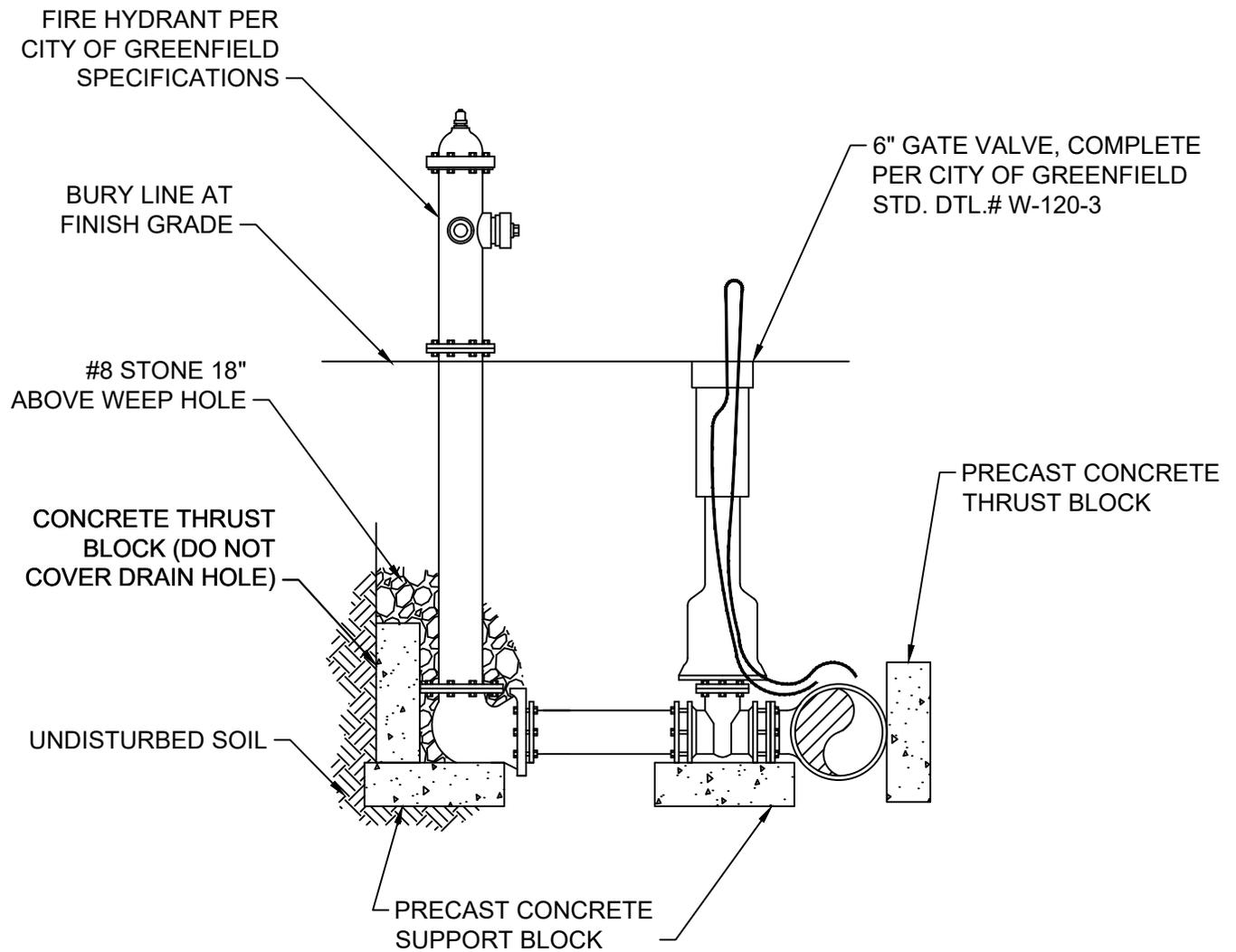
TYPICAL WATER VALVE

Dwn.By: *D.Rodgers*

Origin Date: 11/30/2007

Des. No: W-120-04

Rev. Date: 02/24/2021



FIRE HYDRANT ASSEMBLY

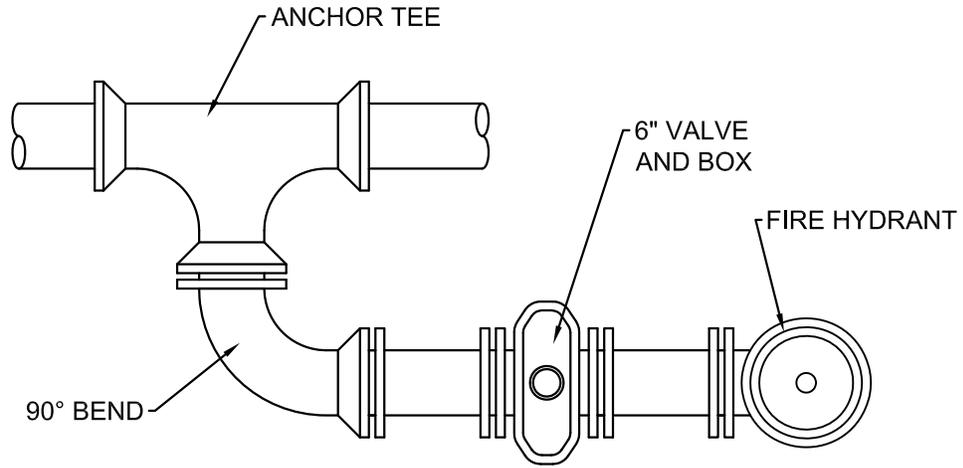
NOTES:

1. Install Joint Restraint System per Project Specifications.
2. Install Thrust Blocking per City of Greenfield Standard Detail #W-122-01.
3. Install Hydrant with nozzle facing the street.

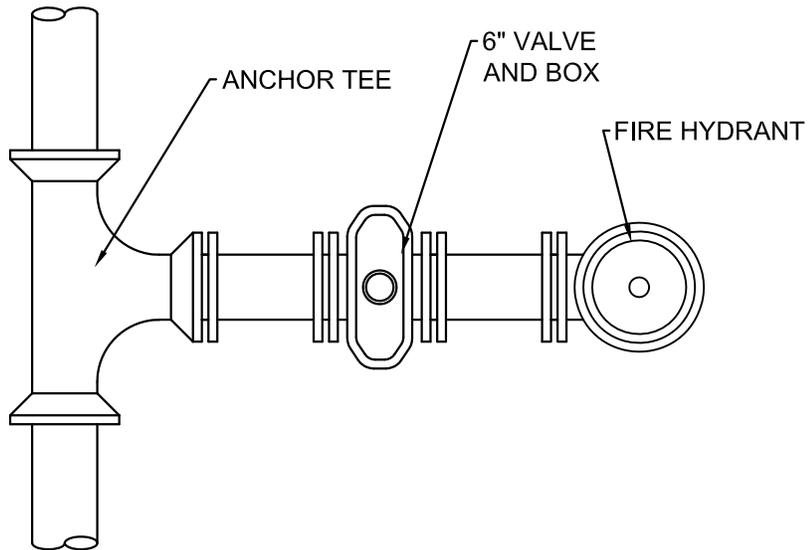
| | |
|---------------------------|-----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| FIRE HYDRANT | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 11/30/07 |
| Des. No: W-121-05 | Rev. Date: 02/24/2021 |

NOTES:

1. All mechanical joints are to be Mega-Lug restrained. Anchor couplings are also acceptable.
2. Install Thrust Blocking per City of Greenfield Standard Trust Block Details and Table.
3. Install Hydrant with nozzle facing the street.



INSTALLATION PARALLEL TO MAIN



INSTALLATION PERPEDICULAR TO MAIN

CITY OF GREENFIELD

STANDARD DETAIL

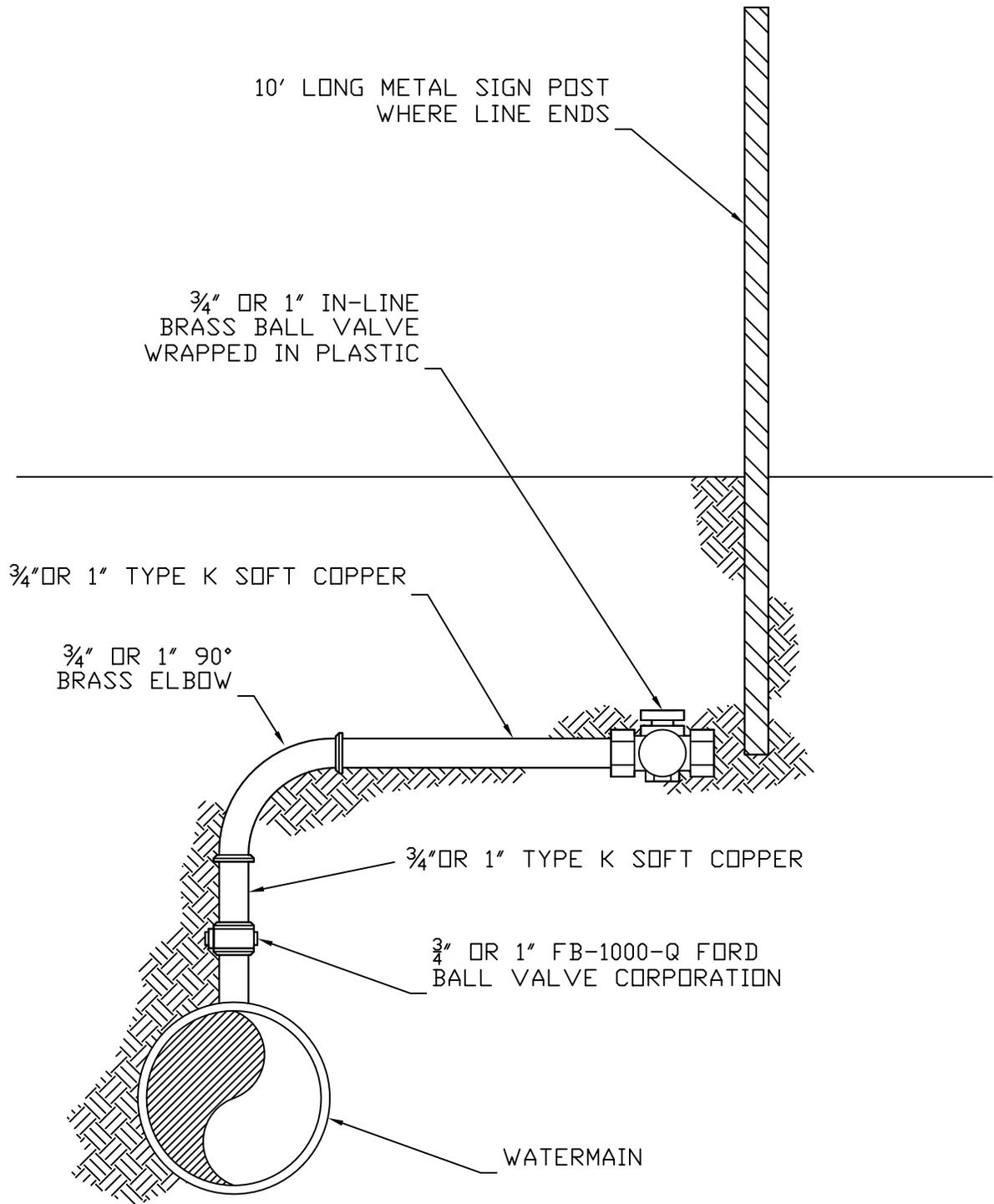
TYPICAL HYDRANT INSTALLATIONS

Dwn.By: *D.Rodgers*

Origin Date: 12/29/98

Des. No: W-123-02

Rev. Date: 06/10/15



CITY OF GREENFIELD

STANDARD DETAIL

WATER LATERAL DETAIL

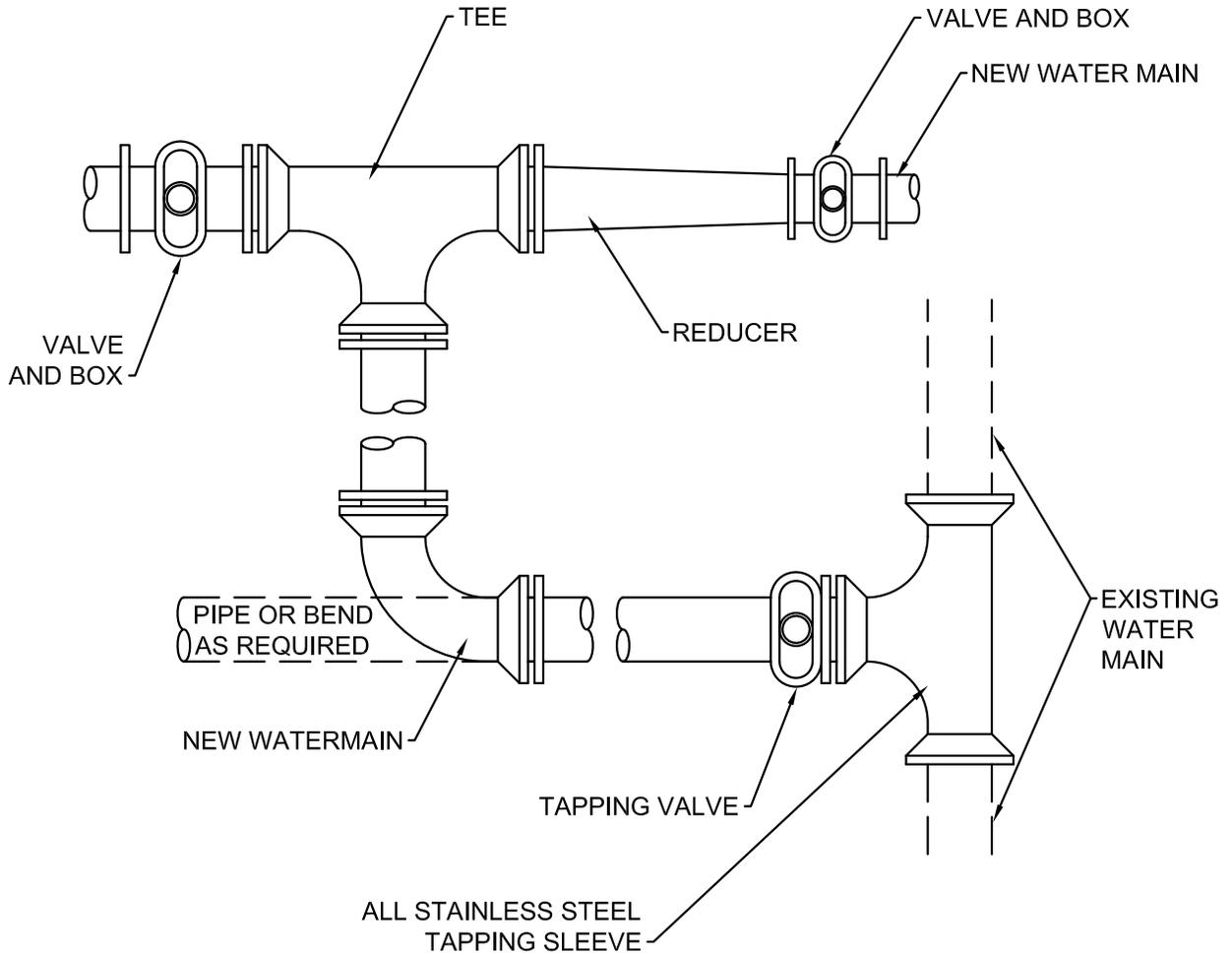
Dwn.By: *D.Rodgers*

Origin Date: 5/22/03

Des. No: W-124-03

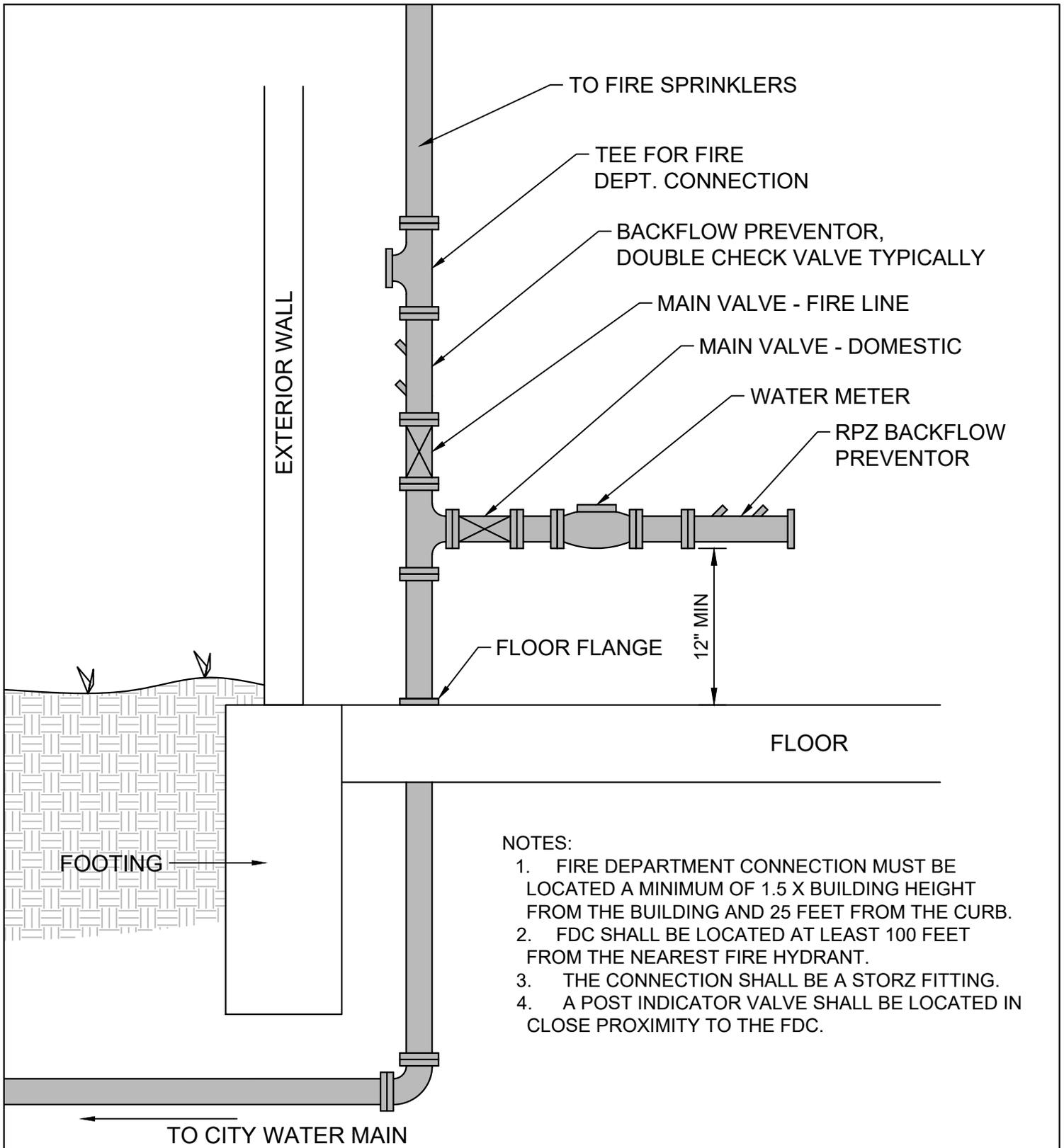
Rev. Date: 01/21/16

NOTE:
 INSTALL BENDS AND FITTINGS AS
 REQUIRED. SEE PLAN SHEETS FOR
 DETAILS.



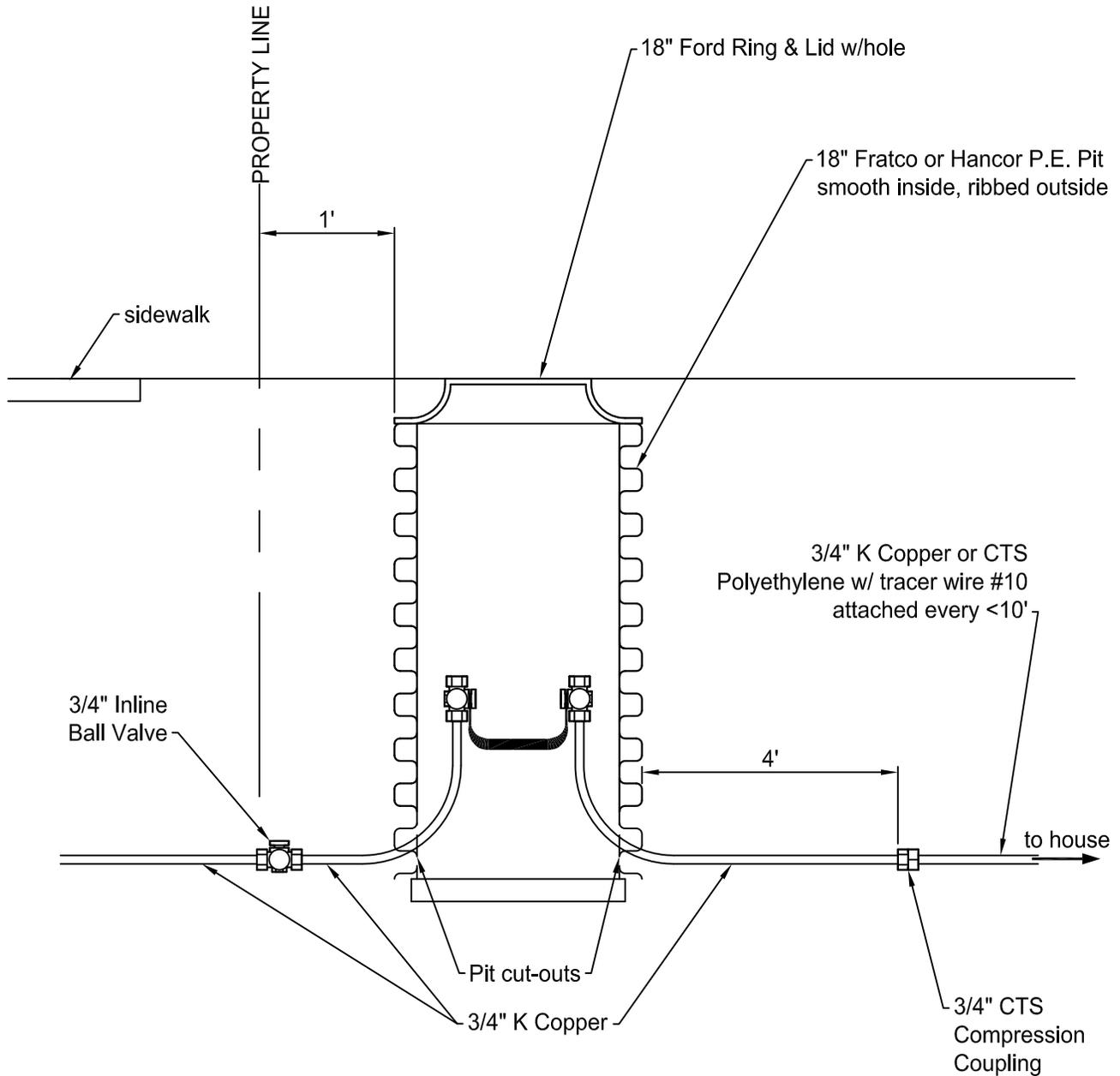
CONNECTION TO EXISTING MAIN

| | |
|----------------------------|----------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| TYPICAL CONNECTION TO MAIN | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 6/23/03 |
| Des. No: W-125-03 | Rev. Date: 01/21/16 |



- NOTES:
1. FIRE DEPARTMENT CONNECTION MUST BE LOCATED A MINIMUM OF 1.5 X BUILDING HEIGHT FROM THE BUILDING AND 25 FEET FROM THE CURB.
 2. FDC SHALL BE LOCATED AT LEAST 100 FEET FROM THE NEAREST FIRE HYDRANT.
 3. THE CONNECTION SHALL BE A STORZ FITTING.
 4. A POST INDICATOR VALVE SHALL BE LOCATED IN CLOSE PROXIMITY TO THE FDC.

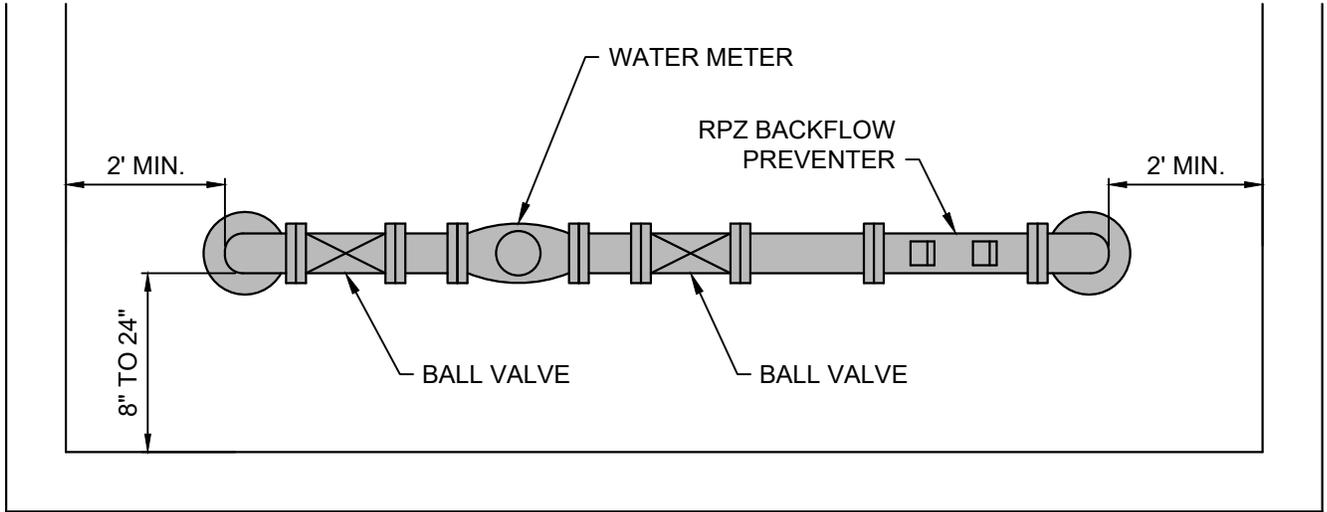
| | |
|-----------------------------------|-------------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| Fire Department Connection | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 10/25/2012 |
| Des. No: W-139-1 | Rev. Date: 04/15/2021 |



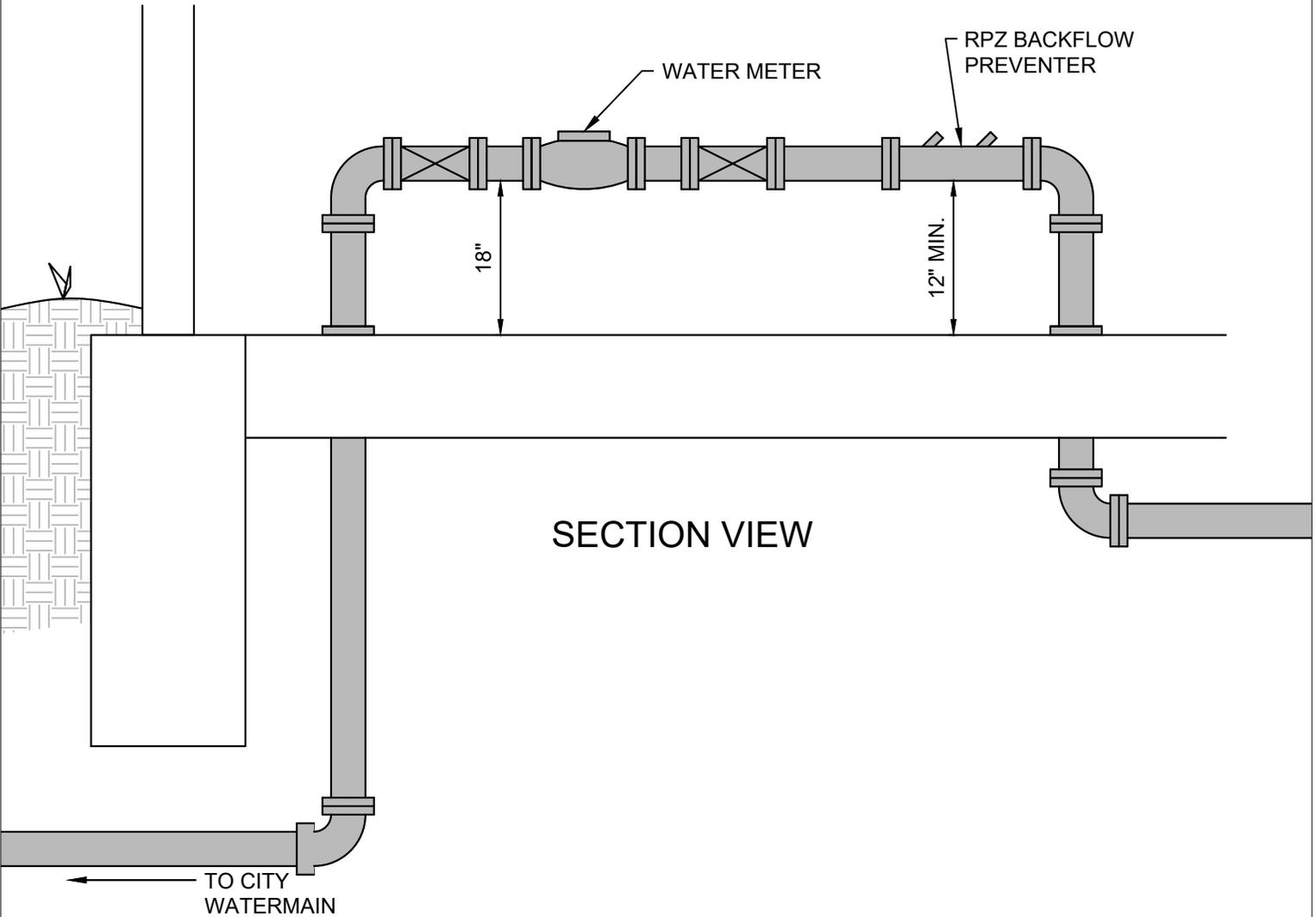
NOTES:

1. Pit Contains: 2 Ford Ball Angle Valves, 1 Ford Yoke Bar-Y
2. In-Line Ball Valve (Stub-out) shall be 1 foot behind Property Line and marked by Steel Sign Post.
3. Bedding and Backfill shall be Sand.

| | |
|---------------------------|-------------------------|
| CITY OF GREENFIELD | |
| STANDARD DETAIL | |
| 3/4" Meter Pit | |
| Dwn.By: <i>D.Rodgers</i> | Origin Date: 11/05/2012 |
| Des. No: W-140-1 | Rev. Date: 1/21/2016 |



PLAN VIEW



CITY OF GREENFIELD

STANDARD DETAIL

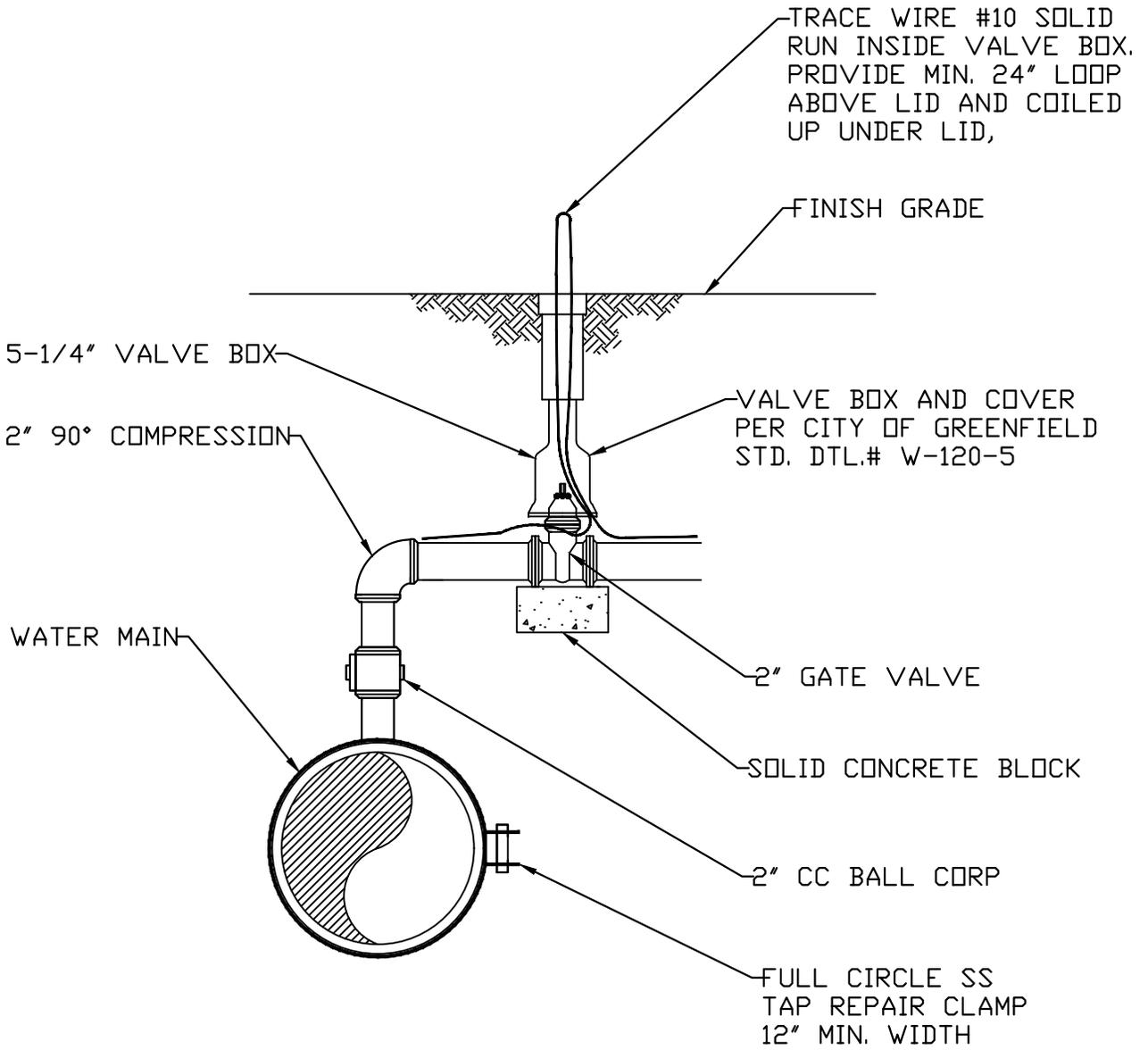
Water Meter with Backflow

Dwn.By: *D.Rodgers*

Origin Date: 02/24/2021

Des. No: W-141

Rev. Date:



CITY OF GREENFIELD

STANDARD DETAIL

2 INCH TAP DETAIL

Dwn.By: *D.Rodgers*

Origin Date: 03/01/21

Des. No: W-142

Rev. Date: