

## SECTION 02500 – PAVING AND SURFACING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Scope: This section covers all work involved in the installation of new pavement, sidewalks, trails, curbs, and the repair and replacement of existing streets, roads, highways, drives, parking areas, curbs, gutters, sidewalks, trails, and other paved areas damaged or destroyed during construction.
- B. New street pavement shall be asphalt only. Any reference to concrete pavement shall apply to the repair and maintenance of existing concrete streets only.
- C. Related Work Specified in the following Section
  - 1. Section 02222 Earthwork for Utilities Subgrade Preparation
- D. Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the reference thereto. Except as specifically modified in this specification, paving and surfacing operations, materials and testing will comply with the most current revisions of applicable sections per the latest version of the Indiana Department of Transportation Standard Specifications.
- E. Definitions
  - 1. Abbreviations
    - a. INDOTSS - Indiana Department of Transportation's Standard Specifications.
    - b. AASHTO - American Association of State Highway & Transportation Officials.
    - c. ACI - American Concrete Institute.
    - d. ASTM - American Society for Testing & Materials.
    - e. NRMCA - National Ready Mix Concrete Association.
  - 2. Rock: A natural aggregate of mineral particles connected by strong and permanent cohesive forces. Rock includes limestone, sandstone, dolomite, granite, marble, and lava.

3. Subgrade: The prepared and compacted soil immediately below the pavement or walk system and extending to such depth as will affect the structural design.
4. Subbase: The layer of specified or selected material of designed thickness placed on a subgrade to support a base course and surface course.
5. Base Course: The layer of specified or selected material of designed thickness placed on a subbase to support a binder or surface course.
6. Binder Course: The layer of specified or selected material of designed thickness placed on a base course to support a surface course.
7. Surface Course: The layer of specified or selected material of designed thickness placed on a subbase or base course to support the traffic load.

## 1.2 QUALITY ASSURANCE

- A. The Developer/Contractor shall employ, at the request of the WPWD or designee, and pay for the services of an independent testing laboratory (unless otherwise noted) to perform specific services and necessary field density tests. The Developer/Contractor shall demonstrate to the WPWD or designee that proper compaction has been obtained and proper asphalt and concrete mix designs are in compliance with the specifications.
- B. Mixing Plant: Prior to placing any hot asphalt pavement or Portland cement concrete pavement, the Contractor shall provide the WPWD or designee the name and location of the bituminous mixing or concrete mixing plant and the type and composition of mixes the Contractor proposes to use in the work. Mix designs shall be submitted and approved before installation.
- C. Paving and surfacing shall comply with the tolerances specified in Sections 401 and 501 of INDOTSS.
  1. Subgrade and subbase shall be within 1/2 inch of dimensions indicated on drawings.
  2. Bituminous base shall not vary longitudinally more than 1/4 inch from a 10-foot straightedge. Bituminous and concrete surfaces shall not vary more than 1/8 inch from a 10-foot straightedge.

3. Finished surface shall be within 1/4 inch of dimensions indicated on drawings.
- D. Asphalt and concrete pavement shall be installed by a contractor whose prime business is asphalt or concrete paving.

### 1.3 JOB CONDITIONS

- A. Do not place paving and surfacing materials on a wet surface, pumping subbase or when weather conditions would prevent the proper construction of paving and surfacing.
- B. Do not place aggregates on frozen subgrade or subbase. Do not place aggregates when ambient air temperature in the shade is below 35°F.
- C. Bituminous materials are to be placed in accordance with INDOTSS Sections 402, 405, and 406.
- D. Portland Cement Concrete Pavement is to be placed in accordance with INDOTSS Section 500.
- E. When air temperatures are at or below 35 degrees F, an admixture is required to be added to the concrete to prevent freezing. Approval must be given prior to placement by the WPWD Inspector.
- F. Do not place paving and surfacing materials when natural light is not sufficient to properly observe work or operations.

### 1.4 GRADE ADJUSTMENT OF EXISTING STRUCTURES

- A. When grade adjustment of existing structures is required, the manhole frames, covers and gratings, and the gas and water valve boxes and covers, shall be removed and reconstructed to grade as required. Maximum amount of riser rings shall be only 12 inches or no more than 3 rings. Greater adjustment than 12 inches shall require a reconstruction of the structure.
- B. On resurfacing work, the manhole castings and valve boxes shall be adjusted to grade flush with pavement using “Mr. Manhole” or similar approved system after the surface course is installed.

## 1.5 CONTRACTOR'S ORGANIZATION

- A. The Contractor shall be a firm whose prime business is asphalt or concrete paving. The Contractor shall have a competent supervisor on the site during the progress of the work, acting for the Contractor in all matters concerning the work. He shall have the authority to receive directions and act upon them for the City through the WPWD or designee.
- B. The Contractor shall keep a set of Plans and Specifications available on the site and in good condition.

## 1.6 TRAFFIC CONTROL

The Developer's Engineer shall plan construction operations so that existing local traffic access can be maintained. If a closure is required, refer to Section 01001. During the construction, the Contractor will also maintain appropriate use of barricades, lights, flagmen and other protective devices, whether specified for the project or required by the local governing authority. Traffic control devices used for maintenance of traffic shall comply with the latest version of the Indiana Manual on Uniform Traffic Control Devices. Temporary pavement markings shall be required after paving until permanent markings can be placed or for the purpose of temporarily shifting traffic patterns. If permanent markings will not be placed until after the winter season, temporary markings shall be paint or thermoplastic by a qualified contractor.

## PART 2 - PRODUCTS

### 2.1 AGGREGATE

- A. Fine aggregates shall consist of natural sand or manufactured sand produced by crushing rock, shells, air-cooled blast furnace slag, or wetbottom boiler slag.
  - 1. Fine aggregates used in Portland cement concrete and bituminous pavements shall be free from injurious amounts of organic impurities. When subjected to the colorimetric test for organic impurities and a color darker than the standard is produced, it shall be tested for effect of organic impurities on strength of mortar in accordance with AASHTO T 71. If the relative strength at 7 and 28 days, calculated in accordance with section 10 of T 71, is less than 95%, it shall be rejected.
- B. Coarse aggregates shall consist of clean, tough, durable fragments of crushed rock, crushed or uncrushed gravel or shells, or crushed and

processed air-cooled blast furnace slag. These materials shall not contain more than 15% flat or elongated pieces and shall not contain particles with an adherent coating. Flat or elongated pieces will be described as pieces having a length in excess of four times its width.

Aggregates shall comply with INDOTSS Section 904.

## 2.2 BITUMINOUS MATERIALS

A. Petroleum asphalt cement shall be homogeneous, free from water, and shall not foam when heated to 347°F.

1. Petroleum asphalt cement shall be PG Binder, grade PG 64-22.
2. Petroleum asphalt emulsion shall be AE-60.

B. Bituminous materials for prime coat shall consist of:

1. Cut-back asphalt - MC-70; or
2. Asphalt emulsion - AE-P.
3. Materials shall conform to INDOTSS Section 902.

C. Bituminous materials for tack coat shall consist of:

1. Asphalt emulsion - AE-T.
2. Materials shall conform to INDOTSS Section 902.

D. Bituminous materials for seal coat shall consist of:

1. Asphalt emulsion - RS-2, AE-90, AE-150, HFRS-2.
2. Materials shall conform to INDOTSS Section 902.

E. Cover aggregate shall consist of:

1. Coarse aggregates, Class A or B, size no. 8, 9, 11 or 12.
2. Fine aggregate (natural sand only), size no. 23 or 24.
3. Materials shall conform to INDOTSS Section 904.

## 2.3 HOT MIX ASPHALT (HMA)

A. Hot mix asphalt (HMA) shall consist of an intimate mixture of coarse aggregate, fine aggregate (including mineral filler if required), and asphalt cement or emulsion combined in proportions specified in INDOTSS Section 402.

- B. When the use of one type or source of aggregate or binder is started, the use of that same type or source shall be continued for the entire lift being constructed, unless otherwise directed by the Engineer.
- C. The use of recycled materials, RAP, shall be permitted per current INDOT standards.
- D. HMA mix design shall be submitted for approval prior to placement of any asphalt.
- E. Preparation of HMA mixtures shall comply with the requirements of INDOTSS Section 402.

## 2.4 PORTLAND CEMENT CONCRETE

- A. Cement shall be Portland cement and shall meet the requirements of ASTM C 150, ACI 301, and ACI 318. Cement shall be Type 1 for normal use, Type 1A where air entrainment is desired, or Type III or Type IIIA where high early strength is desired and authorized by the Engineer. Blended hydraulic cements which meet the requirements of ASTM C 595 Type 1P Portland pozzolan cement may be used where a more watertight concrete is required. Fly ash may also be used as a partial cement replacement for Types 1 or 1A. Cement shall meet requirements specified in INDOTSS Section 901.
- B. Regular fine and coarse aggregates shall meet the requirements of ASTM C 33. Aggregate shall be crushed limestone with a maximum size of 3/4 inch, except in mass concrete the maximum size may be 1 1/2 inches.
  - 1. Lightweight fine and coarse aggregates shall meet the requirements of ASTM C 330.
  - 2. Insulating fine and coarse aggregates shall meet the requirements of ASTM C 332.
- C. Water shall be potable, clean, and free from injurious amounts of oils, acids, alkalis, organic materials, or other substances that may be deleterious to concrete or steel. A maximum of 500 mg/L of chloride ion may be present in the water.
- D. Air entraining admixtures shall meet the requirements of ASTM C 260.
  - 1. Water reducing and retarding admixtures shall meet the requirements of ASTM C494, Type A or Type D; however, they shall contain no chlorides, be nontoxic after 30 days and compatible with the air entraining admixtures. The amount of

admixture added to the concrete shall be in accordance with the manufacturer's requirements. Furnish a compliance statement that the admixture used satisfies all requirements of this specification. Evidence that the admixture is included in the approved list of the INDOTSS Division of Materials and Tests, in accordance with INDOTSS Section 912, will satisfy the requirement for a compliance statement.

2. Fly ash shall meet the chemical and physical requirements of ASTM C 618 for mineral admixture Class F, except loss on ignition shall not exceed 6%. Fly ash shall be sampled and tested in accordance with ASTM C 311 prior to use.
- E. Reinforcing steel shall meet the requirements of ASTM A 615, Grade 60.
1. Welded wire fabric or wire mesh shall meet the requirements of ASTM A 185.
  2. Reinforcing steel and appurtenances shall follow INDOTSS Section 910.
- F. Preformed expansion joint filler shall meet the requirements of ASTM D1752, Type III.
1. Hot-poured elastic joint filler shall meet the requirements of ASTM D1190.
  2. Waterproof expansion joint filler shall meet the requirements of ASTM D1850.
  3. Joint materials specified in INDOTSS Section 906 may be used, approved by the Engineer.
- G. Concrete pavement shall be wet cured by using burlap, waterproof blankets, or ponding; or by using a membrane compound. If the membrane method is used, the compound shall be Type 2, complying with AASHTO M148 for white pigmented compound. A pressure sprayer capable of applying a continuous uniform film to the pavement surfaces will be required.
1. Dowel bars and assemblies shall conform to the requirements of INDOTSS Section 503.
- H. Concrete base shall meet the requirements of INDOTSS Section 305.
- I. Reinforced concrete pavement shall meet the requirements of INDOTSS Section 501.

J. Reinforced concrete for sidewalks and steps shall meet the requirements of INDOTSS Section 604.

K. Reinforced concrete for curbing shall meet the requirements of INDOTSS Section 605.

## 2.5 UNDERDRAINS

Underdrain material shall be 6-inch double wall smooth bore subsurface drain pipe. It shall be cleaned and televised prior to acceptance.

## PART 3 - EXECUTION

### 3.1 GENERAL

A. The Contractor is responsible to provide equipment, workmanship and materials required to achieve a finished product that meets these specifications.

B. Use compaction equipment suitable to the material being placed. Compacting equipment shall include at least one piece of equipment capable of providing a smooth even surface on the pavement surface course.

C. Prior to placing paving and surfacing materials, shape subgrade as required to produce finished pavement grades and cross-sections shown on drawings.

D. Do not place paving and surfacing material before subgrade is reviewed (proof roll) and accepted by the WPWD or designee. Do not place paving and surfacing materials on a frozen or muddy subgrade (INDOTSS Section 203).

E. Compact subgrade to not less than 100% of its maximum density as determined in accordance with AASHTO T99.

F. Provide adequate drainage at all times to prevent water from standing on subgrade, pavement or walks.

### 3.2 SUBGRADE

The subgrade material and testing shall comply with INDOTSS Section 207, before placement of subbase.

### 3.3 SUBBASE PREPARATION

Subbase shall meet the requirements of INDOTSS Section 302.

### 3.4 AGGREGATE BASE, SURFACE, OR SHOULDERS

- A. Aggregate base, surface, or shoulders shall consist of crushed rock or gravel. The aggregate type shall be suitable for the area in which the project is located. The aggregate thickness shall be as shown on the drawings and as specified herein.
- B. Aggregate shall be Type “A” mix, unless otherwise specified by the WPWD.
- C. Compacted aggregate materials and construction shall conform to INDOTSS Section 303.
- D. If the required thickness of the aggregate (Type A) exceeds 4 inches, the material shall be placed and compacted in separate lifts no less than 2 inches nor more than 4 inches of compacted depth. If Type P aggregate is used, it may be placed in individual lifts with a thickness of up to 6 inches.
- E. If spreading devices are used which will ensure proper depth and alignment, forms will not be required; otherwise, forms shall be required. Forms shall be of wood or steel, adequate in depth, straight, of uniform dimensions and equipped with positive means for holding the form ends rigidly together and in line. Segregation of material shall be avoided by any spreading method used. No payment will be made for aggregate placed beyond the dimensions shown on the drawings.
- F. Compact material in each lift after material is spread and shaped. Compact material to not less than 100% of maximum dry density as determined by AASHTO T99. Use construction procedures, including sufficient wetting and number of passes, to ensure specified density is attained.
- G. The Contractor shall employ an independent testing laboratory to perform field density tests to demonstrate proper compaction of aggregate surface pavement, if requested by the WPWD or designee.
- H. Unless otherwise shown on the drawings, the minimum section (excluding subgrade) of reinforced concrete shall be 6 inches of compacted #53, Type “A” aggregate base and 6 inches of 4,000 psi reinforced concrete.

- I. Unless otherwise shown on the drawings, for a street with a concrete base and an asphalt surface, the replacement section shall be a new concrete base, not less than 6 inches thick with HMA base to within 1-1/2 inch of the existing grade and then 1-1/2 inch of HMA surface.
- J. Unless otherwise shown on the drawings, chip and seal pavements shall have 8 inches of compacted aggregate base (#53, Type "A" crushed stone) and 1 inch processed bituminous coated aggregate pavement placed and rolled.
- K. Unless otherwise shown on the drawings, gravel pavement shall be replaced with 6 inches of #53, Type "A" compacted stone or gravel aggregate.

### 3.5 HOT MIX ASPHALT

- A. This work shall consist of constructing one or more courses of HMA base, intermediate, and wedge leveling or surface mixtures on a prepared foundation in accordance with these specifications and in reasonably close conformance with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer.
  - 1. If the required finished depth of any course is to exceed three times the top size of the aggregate used as shown by actual screen analysis, the course shall be constructed in two or more lifts, as directed.

Mix type shall be as indicated on the drawings, without exception, unless otherwise approved in writing by the WPWD Engineer.

    - a. Job mix formulas shall be prepared and submitted for approval in accordance with INDOTSS Section 402. The job mix formula shall include standard bituminous mixture information including, but not limited to, aggregate gradation, binder content, maximum specific gravity, and air voids.
  - 2. Materials and construction requirements shall comply with the requirements of INDOTSS Section 402.
- B. Place and spread bituminous base mixture with a bituminous paver. In areas inaccessible to a paving machine, place and spread bituminous base mixture by other acceptable mechanical or hand methods.

- C. Tack coat shall be placed on existing bituminous and/or concrete surfaces before a new lift of bituminous material is added. Apply tack coat uniformly at a rate meeting INDOT specifications.
  - 1. Patch and clean existing surface. The surface shall be free of irregularities and provide a reasonably smooth and uniform surface to receive the tack coat. Remove and replace unstable corrugated areas with suitable patching materials.
  - 2. Tack coat shall be placed in accordance with INDOTSS Section 406.
- D. Placement and compaction of hot mix asphalt (HMA) shall conform to INDOTSS Section 402.
- E. Place binder used for wedging or leveling, approaches and feathering by mechanical methods or acceptable hand methods for placing and spreading in accordance with INDOTSS Section 400.

3.6 SEAL COAT AND COVERING AGGREGATE (CHIP AND SEAL)

- A. Application shall be as follows

<u>Seal Type</u>	<u>Cover Aggregate Size Number</u>	<u>Rate of Application per Square Yard</u>	
		<u>Aggregate Pounds</u>	<u>Bituminous Material Gallons at 60°F</u>
1-Single Application (only AE-90 or AE-150)	23, 24	12-15	0.12-0.16
2-Single Application	12	14-17	0.29-0.33
5-First Application	11	16-20	0.36-0.40
Second Application	12	16-19	0.33-0.37

- B. Seal coat and covering aggregate shall be placed in accordance with INDOTSS Section 404.

3.7 PORTLAND CEMENT CONCRETE PAVEMENT

- A. Portland cement concrete pavement shall consist of a coarse aggregate base (if required) and a reinforced or unreinforced Portland cement concrete surface, as shown on the drawings.
  - 1. Use No. 53, Type “A” coarse aggregate for subbase, unless otherwise shown or specified.

2. Pavement cross-section shall be as shown on drawings.
- B. Where an aggregate base course is shown or specified, it shall be constructed in accordance with Article 3.3 of this specification.
- C. Portland cement concrete pavement operations and materials shall comply with INDOTSS Section 501 unless otherwise specified by the WPWD.
1. Alternate equipment to that specified in INDOTSS Section 501 shall be allowed provided that line, grade, surface, smoothness and other requirements of the specifications are met. The equipment used shall be subject to the approval of a Professional Engineer licensed in the State of Indiana.
  2. Expansion and contraction joints shall be installed as indicated on the drawings or as required by INDOT standards. Expansion joints shall be required whenever new concrete abuts fixed objects or existing concrete surfaces, whether or not shown on the drawings.
  3. Keyway construction, load transfer devices, tie bars and slab and ear reinforcement shall be installed as indicated on the drawings.
  4. Unless otherwise shown on the drawings, the final finish of concrete pavement shall be by brooming, as set out as Method 1 in INDOTSS Section 504, to form a transverse skid-resistant finish.
  5. The Contractor shall always have materials available to protect the surface of concrete against rain. These materials shall consist of burlap, curing paper or plastic sheeting.
  6. New concrete pavement shall be protected by the Contractor until opening to traffic is approved by a Professional Engineer licensed in the State of Indiana. It shall not be opened to traffic until the field-cured concrete has attained a flexural strength of 550 psi, or a compressive strength of 3,500 psi. If such tests are not conducted, the pavement shall not be opened to traffic until 14 days after the concrete was placed. Before opening to traffic, the pavement shall be cleaned and permanent lane markings applied to the pavement.

### 3.8 SIDEWALKS

- A. Sidewalks shall consist of a coarse aggregate subbase and concrete surface. Use No. 24 fine aggregate for subbase, unless otherwise shown. Concrete shall be Class "A", 4,000 psi concrete.

- B. Subbase shall be 2 inches thick, and concrete shall be 4 inches thick, unless crossing driveways, of which concrete will be 6 inches thick.
- C. Compact subbase to not less than 95% of maximum dry density, as determined in accordance with AASHTO T99.
- D. Proportion, mix, and place concrete as specified in INDOTSS Sections 604 and 702. Walks shall have a broom surface finish. Edge all outside edges of walk and all joints with a 1/4 inch radius edging tool.
- E. Unless otherwise shown on the drawings, walks shall be divided into sections not more than five feet in length by dummy joints formed by a jointing tool with a 1/4 inch radius.
- F. Sidewalks and handicap ramps shall conform to the most recent updated ADA standards. All handicap ramps shall be properly identified on the as-built drawings submitted to the WPWD.
- G. Form construction joints around all abutting structures and appurtenances such as existing manholes, utility poles, hatches, and hydrants. Install 1/2 inch thick pre-molded expansion joint filler in construction joints. Expansion joint material shall extend for the full depth of the walk.
- H. If existing sidewalk is to be removed and replaced with new sidewalk or new sidewalk extended from existing sidewalk, the existing sidewalk shall be removed to the nearest joint of suitable quality or as directed by the WPWD.

### 3.9 CURBS

- A. The construction of curbs, combination curb and gutter, and integral curb and gutter shall be in accordance with these specifications and as shown on the plans and shall be in reasonably close conformance with the lines and grades shown on the plans or as directed by a Professional Engineer licensed in the State of Indiana.
- B. Excavation for curbs shall be made to the required depth and the subgrade or base upon which the curb is constructed shall be compacted to a firm, even surface to not less than 95% of maximum dry density as determined in accordance with AASHTO T99.
- C. Concrete for curbs shall be Class A, 4,000 psi.
- D. The curbs shall be constructed by the use of wood or metal forms, or a curb slip form machine. Forms, if used, shall be straight, free from

warped or bent sections, and shall extend for the entire depth of the curb and shall be securely held in place so that no deviation from alignment and grade will occur during placement of concrete. The concrete shall be consolidated by vibration or other acceptable methods. The top of the curb shall be floated smooth and the top outer corner rounded to a 1/4 inch radius.

- E. The face, top, and gutter of curbs shall not have deviations or irregularities of more than 1/4 inch when checked with a 10 foot straightedge.
- F. Construction joints shall be placed at 5 foot intervals, unless otherwise shown or directed by a Professional Engineer licensed in the State of Indiana. The joint shall be uniform, of 1/8 to 1/4 inch in width, and to a depth of approximately 2-1/2 inches. The joint may be formed using concrete tools, saw cut or formed by approved removable strips providing a straight joint at right angles to the length of curb. Joints shall be filled with specified bituminous joint filler material. Construction joints shall be formed around all abutting structures such as inlets and shall be as specified previously.
- G. As soon as possible after placing and finishing of concrete, the curbing shall be moistened and kept moist for three days, or cured with the use of a specified membrane compound.
- H. If existing curb is to be removed and replaced with new curb or new curb extended from existing curb, the existing curb shall be removed to the nearest joint.
- I. During the placement of new concrete curb, utility markings shall be embossed into the top of the curb. The marking shall be a 2 inch high letter stamped into the concrete utilizing a stamping tool approved by the WPWD Inspector before the concrete sets up. Any stampings missed during original installation shall be sandblasted in per the direction of the WPWD Inspector. The letters shall be located perpendicular from the utility feature that is being marked.

The letters shall be as follows:

- G = Gas
- C = Conduit
- SS = Sewer Service Lateral
- MH = Storm or Sanitary Manhole
- W = Water Service Lateral
- V = Water Valve
- D = Subsurface Drain Lateral
- FO = Fiber Optic

### 3.10 PAVEMENT MARKING

- A. Pavement markings are to be in accordance with all applicable standards of INDOTSS Section 808 and MUTCD. All markings shall be thermoplastic unless otherwise approved by WPWD.
- B. Parking lots are to be striped in accordance with INDOTSS Section 808. Spaces to be striped shall be 4 inch wide stripes.
- C. Contractor shall clean the new pavement surface to remove all dust, dirt, mud and debris prior to striping.

### 3.11 TESTING FOR HOT MIX ASPHALT (HMA)

- A. At the discretion of the WPWD the Developer/Contractor shall employ and pay for the services of a competent independent testing laboratory to take cores at selected locations and perform described tests. Compaction requirements for HMA mixtures placed in accordance with INDOTSS Section 402 shall be controlled by in place density determined from cores cut from the compacted pavement. A minimum of two cores per section shall be cut for each course of each material or as directed by the WPWD. Sections are defined as a maximum of 1000 Mg (1041 ton) of HMA base or intermediate or 600 Mg (624 ton) of HMA surface. The transverse core location shall be located so that the edge of the core will be no closer than 75 mm (3 inches) from a confined edge or 150 mm (6 inches) from a non-confined edge of the course being placed.
- B. For compaction of HMA mixtures with quantities less than 100 Mg (104 ton) per day, acceptance may be visual as determined by the Engineer.
- C. The Contractor along with their independent testing lab representative shall obtain cores in the presence of the WPWD with a device that shall produce a uniform 150 mm (6 inches) in diameter pavement sample. Each HMA course shall be cored within one workday of placement. Damaged core(s) shall be discarded and replaced with a core from a nearby location as selected by the Engineer.
- D. The Contractor, in the presence of the WPWD, shall mark the core to define the course to be tested. If the defined area is less than 1.5 times the maximum particle size, the core will be discarded and a core from a new random location will be selected for testing as determined by the Engineer. Within one work day of coring operations the Contractor shall clean, dry, refill and compact the core holes with suitable material approved by the Engineer.

- E. The Contractor's testing lab representative shall take immediate possession of the cores. If the cores are subsequently damaged, additional coring within the specific section(s) will be required at locations to be determined by the WPWD.
- F. Each core shall be tested within one work day of coring operation to determine thickness, bulk specific gravity, aggregate gradation and binder content. Test results shall then be transmitted either verbally or by other means to both the Contractor and the WPWD for verification before each subsequent bituminous lift is placed.
1. Average thickness of the cores shall not vary from the plan thickness more than 12.5 mm (0.5 inch) for HMA base and intermediate course(s) and 6.25 mm (0.25 inch) for HMA surface course(s) for acceptance in accordance with INDOTSS Section 105.
  2. The bulk specific gravity shall be determined in accordance with AASHTO T166 or AASHTO T275. The in place density of a section for a mixture shall be expressed as:  
$$\text{Density \%} = (\text{BSG}/\text{MSG}) * 100$$
where:  
BSG = bulk specific gravity as determined from independent testing laboratory  
MSG = maximum specific gravity as reported on job mix formula.
  3. The calculated density of the cores shall not be less than 90% nor more than 96% a set out above. Test results which are outside stated limits shall be considered and adjudicated as a failed material in accordance with INDOTSS Section 105.
- G. The Contractor's independent testing laboratory representative shall determine the aggregate gradation and binder content of the core samples in accordance with ITM 571. Aggregate gradation shall be within tolerances set forth in INDOTSS Section 402 and binder content shall be within  $\pm 0.5$  percent from the job mix formula. Test results which are outside the stated limits shall be considered and adjudicated as a failed material in accordance with INDOTSS Section 105.

- H. A copy of all core test results shall be submitted to the Engineer for verification of specification compliance within one calendar week of core testing.
- I. The Contractor shall make the following tests at their cost and they shall be as specified in this Article and requested by the Engineer. Perform tests in accordance with the following ASTM Specifications:

<u>Test</u>	<u>ASTM Specification</u>
Slump	C143
Air Content	C173
Test Cylinders	C31 or C513
Core Samples	C42
Fly Ash	C311

1. Measure slump each time test beams or cylinders are to be made and at any other time requested by the WPWD. The slump shall be as specified in INDOTSS Section 501, or as otherwise specified herein, unless specifically accepted by the WPWD.
2. Measure air content each time test beams or cylinders are to be made and at any other time requested by the WPWD. The field test may be omitted if the air content is known prior to taking samples. The field test may not be omitted if fly ash is used in the mix.
3. Concrete paving mixes shall comply with guidelines and testing requirements of INDOTSS Section 501. However, in lieu of forming test beams as described in Section 501, the Contractor may substitute cylinder tests as follows:
  - a. Make test cylinders in sets of four. Field cure one cylinder and break at seven days. Laboratory cure the remaining three cylinders and break at 28 days. The Contractor shall be responsible for handling and transportation of cylinders.
  - b. If fly ash is used in the mix, a total set of seven cylinders shall be taken. The additional three cylinders shall be laboratory cured and broken at 56 days, if the 28-day strength does not meet specifications.
  - c. Make one set of test cylinders for each 100 cubic yards, or fraction of 100 cubic yards, of concrete placed; or at other times requested by the WPWD.

- d. Unless otherwise specified, concrete shall have a 28-day compressive strength of 4,000 psi, as demonstrated by laboratory tests of cylinders.

### 3.12 PROTECTION

- A. Maintain compacted aggregate subbase and surface true to line and grade and required density. Maintain surface until job is complete.
- B. Do not permit vehicular traffic of any kind on any bituminous course until the bituminous mixture has hardened sufficiently not to be distorted beyond specified tolerances. Remove any foreign material which is on the surface of any course before the course is rolled or any subsequent course is placed.
- C. Do not permit traffic on concrete pavement or sidewalks until concrete has developed sufficient strength not to be marked or damaged. Do not permit vehicular traffic on concrete for at least 14 days.
- D. Repair or replace damaged pavement and sidewalks to the satisfaction of the WPWD or designee.

### 3.13 CLEANUP

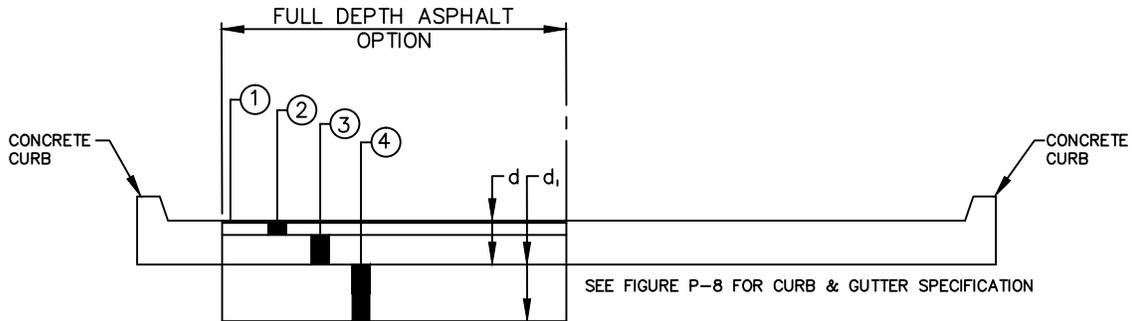
Clean up the job site following pavement and surfacing restoration. Remove all rubbish, excess materials, temporary structures, and equipment. Leave the work in a neat and presentable condition.

## PART 4 - FIGURES

### 4.1 STANDARD PAVEMENT DETAILS

<u>FIGURE</u>	<u>DESCRIPTION</u>
P-1	Typical Pavement Sections
P-2	Typical Pavement Sections
P-3	Typical Pavement Sections
P-4	N/A
P-5	Concrete Joint Details
P-6	Structure Details
P-7	N/A
P-8	Concrete Curb and Gutter Type I & II
P-9	Underdrain Detail
P-9a	Underdrain Detail
P-10	Sidewalk Details
P-11	Sidewalk Curb Ramp Notes
P-12	Cul-de-sac Detail
P-13	Subdivision Temporary Cul-de-sac
P-14	Standard Barricade
P-15a	Street Sign Material Detail
P-15b	Street Name Sign Detail
P-15c	Street Name Sign Detail
P-15d	Regulatory Sign Detail
P-16	Bicycle/Jogging Trail Detail
P-17	Typical Driveway Section
P-18	N/A
P-19	Repair Cuts Within Pavement Limits

END OF SECTION 02500



### LOCAL STREETS

	ASPHALT 1 d=10.5" d=12" d+d=22.5"	ASPHALT 2 d=10.5" d=14" d+d=24.5"
①	1.5" SURFACE 9.5 mm	1.5" SURFACE 9.5 mm
②	3" BINDER 19 mm	3" BINDER 19 mm
③	6" COMP. AGGR. (SIZE No. 53)	6" COMP. AGGR. (SIZE No. 53)
④	12" COMP. AGGR. (SIZE No. 53)	14" LIME TREATED * SUBBASE

NOTE:

\* LIME MODIFICATION SHALL BE IN ACCORDANCE WITH INDOTSS 215 AND 913.

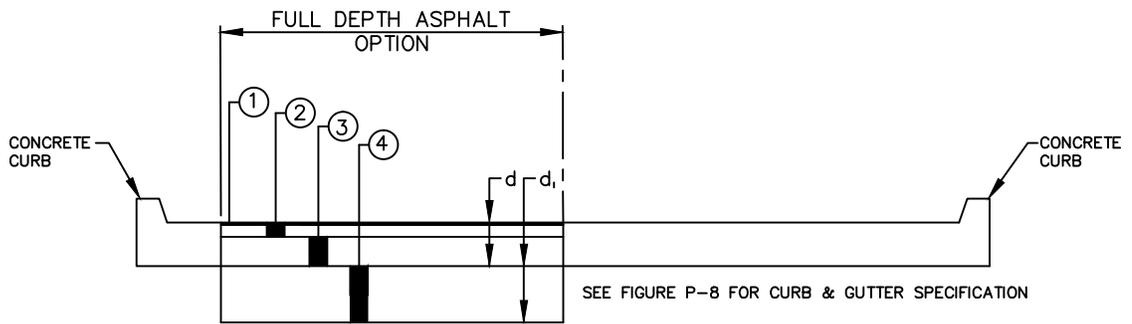
## TYPICAL PAVEMENT SECTIONS



CITY OF WESTFIELD, INDIANA

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DATE

FIGURE P-1



### COLLECTOR STREETS

	ASPHALT 1 d=6.5" d=12" d+d=18.5"	ASPHALT 2 d=6.5" d=14" d+d=20.5"
①	1.5" SURFACE 9.5 mm	1.5" SURFACE 9.5 mm
②	2.5" BINDER 19 mm	2.5" BINDER 19 mm
③	2.5" BINDER 19 mm	2.5" BINDER 19 mm
④	12" COMP. AGGR. (SIZE No. 53)	14" LIME TREATED * SUBBASE

**NOTE:**

\* LIME MODIFICATION SHALL BE IN ACCORDANCE WITH INDOTSS 215 AND 913.

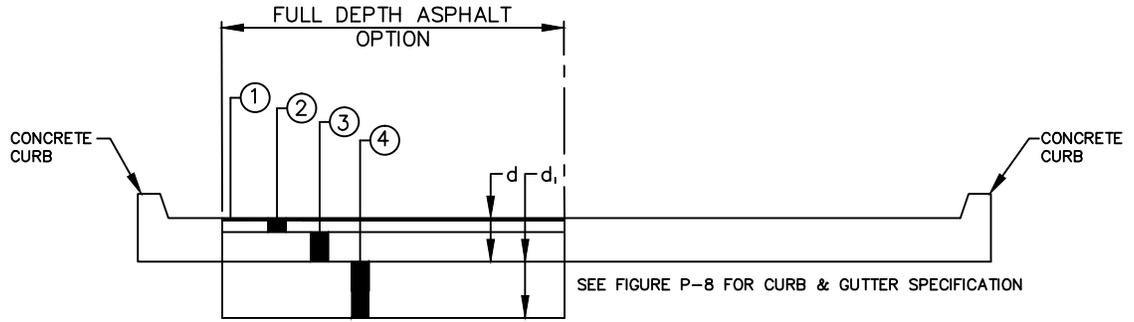
## TYPICAL PAVEMENT SECTIONS



# CITY OF WESTFIELD, INDIANA

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 4/1/14  
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FIGURE P-2



## INDUSTRIAL AND ARTERIAL

	ASPHALT 1 d=10" d=12" d+d=22"	ASPHALT 2 d=10" d=14" d+d=24"
①	1.5" SURFACE 9.5 mm	1.5" SURFACE 9.5 mm
②	2.5" BINDER 19 mm	2.5" BINDER 19 mm
③	6" BINDER 19 mm	6" BINDER 19 mm
④	12" COMP. AGGR. (SIZE No. 53)	14" LIME TREATED * SUBBASE

**NOTE:**

\* LIME MODIFICATION SHALL BE IN ACCORDANCE WITH INDOTSS 215 AND 913.

## TYPICAL PAVEMENT SECTIONS

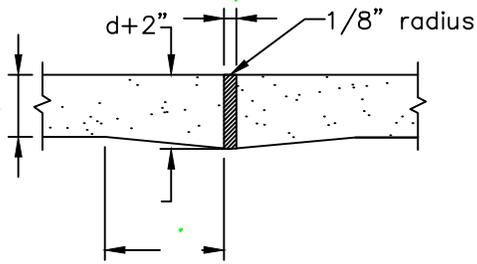


CITY OF WESTFIELD, INDIANA

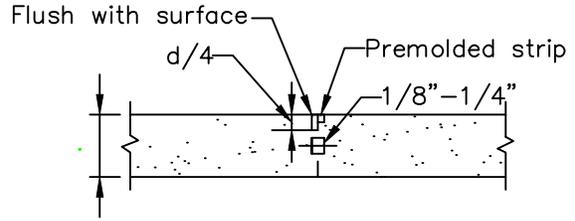
*Neil B. Vantrees*

4/1/14  
DATE

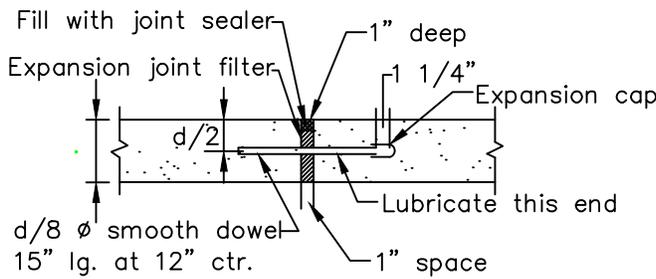
FIGURE P-3



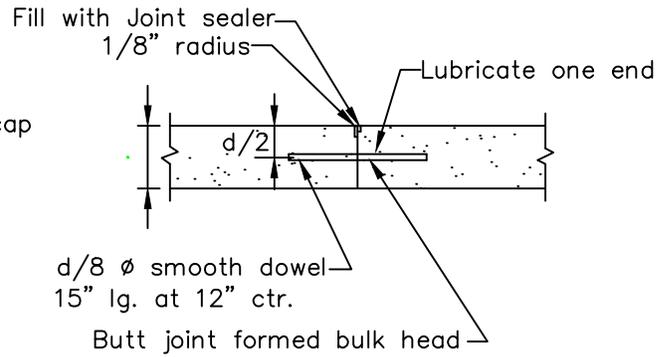
**TYPE A**  
EXPANSION JOINT



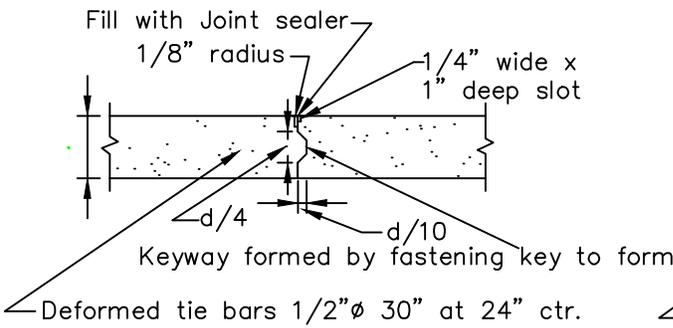
**TYPE C**  
SAWED OR PREMOLDED STRIP  
Longitudinal or Transverse



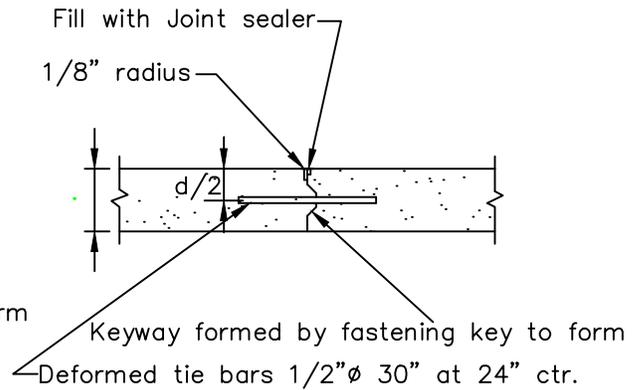
**TYPE A-ALTERNATE**  
EXPANSION JOINT



**TYPE D**  
TRANSVERSE CONSTRUCTION JOINT



**TYPE B**  
LONGITUDINAL CONSTRUCTION JOINT



**TYPE E**  
TIED TRANSVERSE CONSTRUCTION JOINT

## CONCRETE JOINT DETAILS

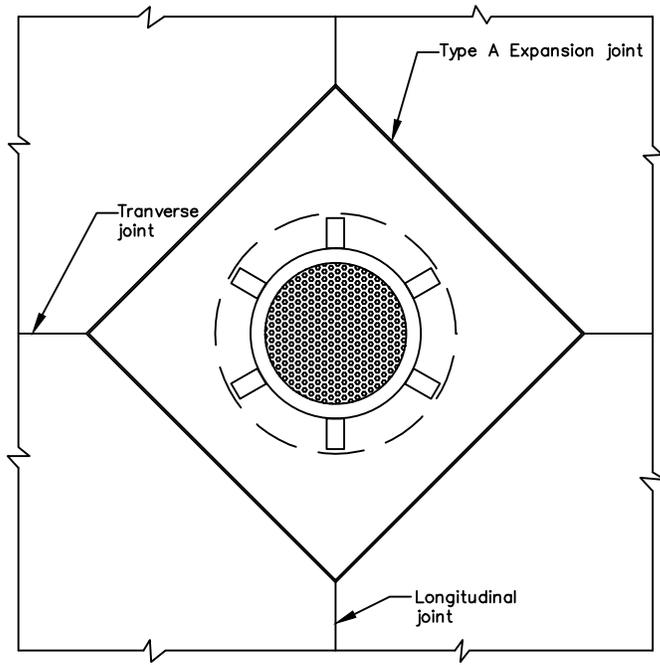


CITY OF WESTFIELD, INDIANA

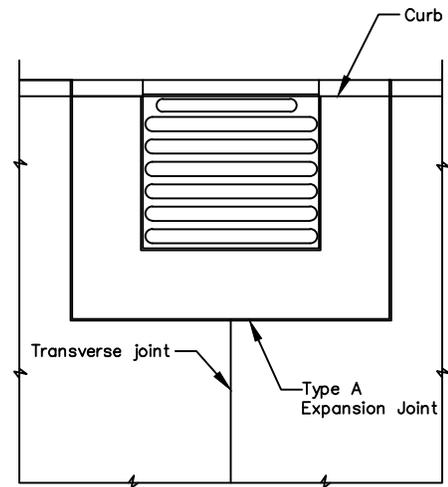
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4/1/13  
DATE

FIGURE P-5



Manhole Boxout



Catch Basin Boxout

1. All catch basins shall be separated from the pavement and curb by boxing out around basin as shown above. Expansion joint material shall extend completely through curb and slab. Manhole castings within the pavement limits shall be boxed in like manner except when telescoping-type castings are used.
2. When a joint falls within 5 ft. of or contacts basins, manholes, or other structures, shorten one or more panels either side of opening to permit joint to fall on round structures and at or between corners of rectangular structures.

## STRUCTURE DETAILS

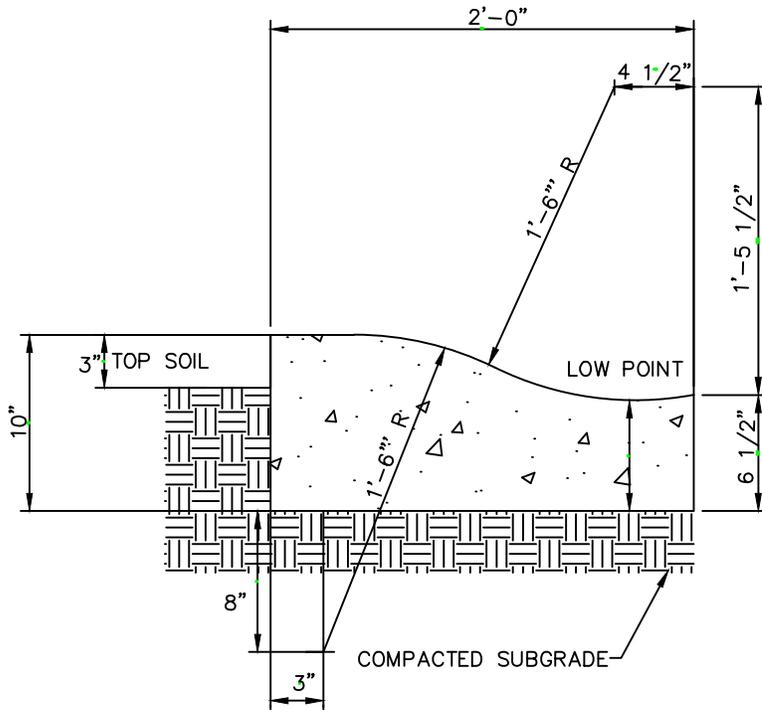


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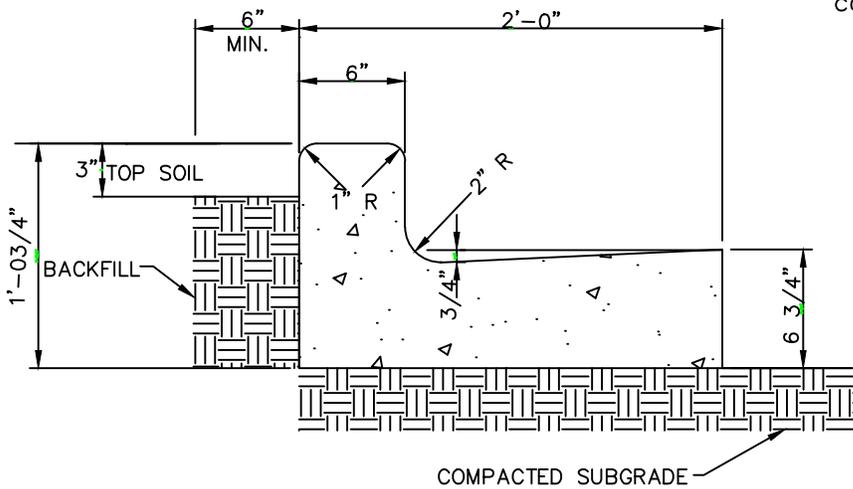
4/1/13  
DATE

FIGURE P-6



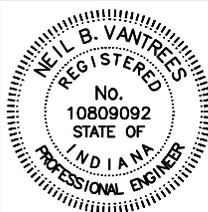
TYPE I

\*NOTE – No backfilling, paving, or compaction may be done until 72 hours after the placement of the concrete.



TYPE II

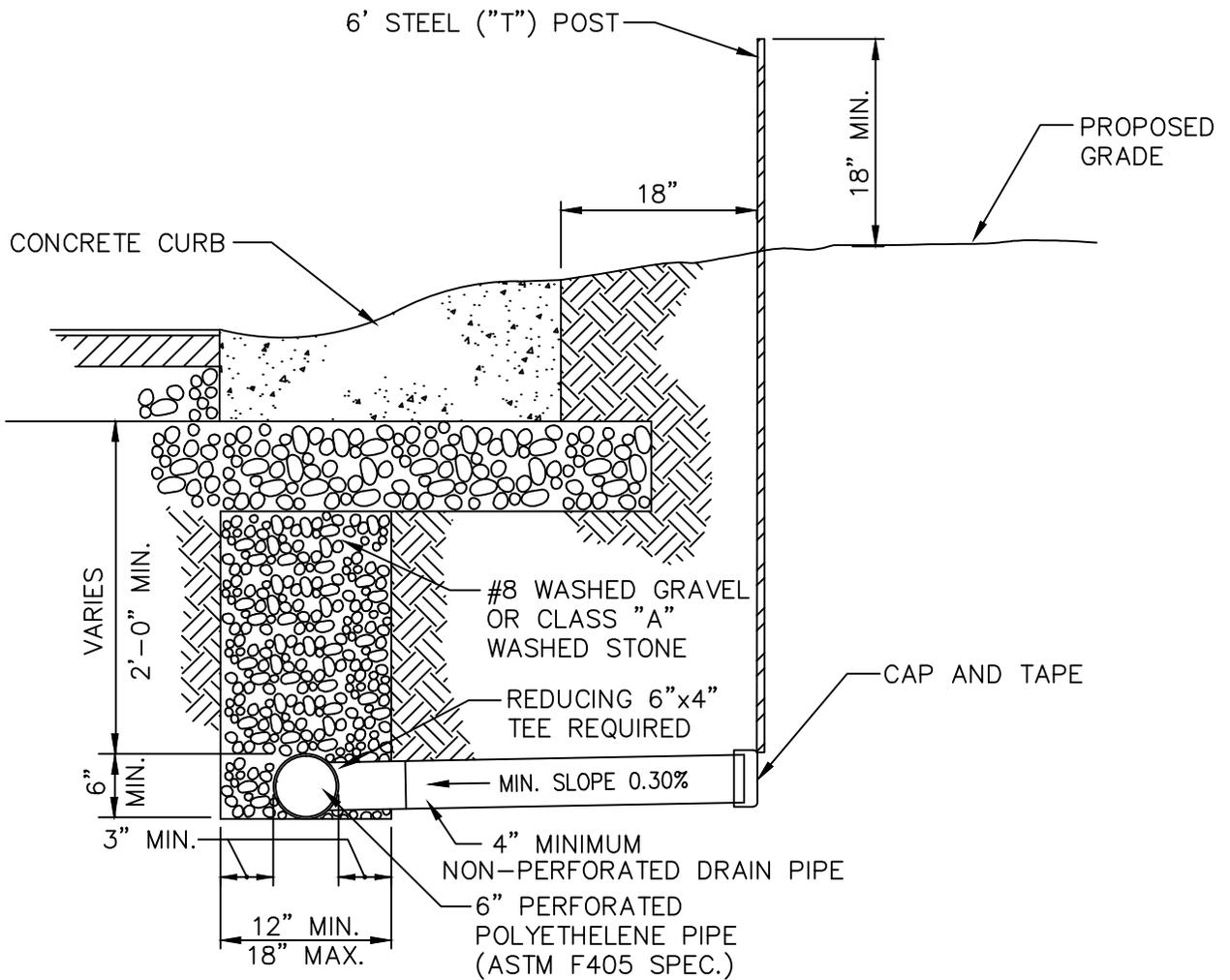
CONCRETE CURB AND GUTTER TYPE I & II



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DATE

FIGURE P-8



**NOTE:**

1. ALL MEASUREMENTS TO BE MEASURED FROM BACK OF CURB.
2. LATERAL LOCATIONS SHALL BE STAMPED ON CURB.
3. MATERIALS AND INSTALLATION SHALL MEET THE INDOT STANDARDS AS SPECIFIED IN SECTION 718 "UNDERDRAINS"

UNDERDRAIN DETAIL

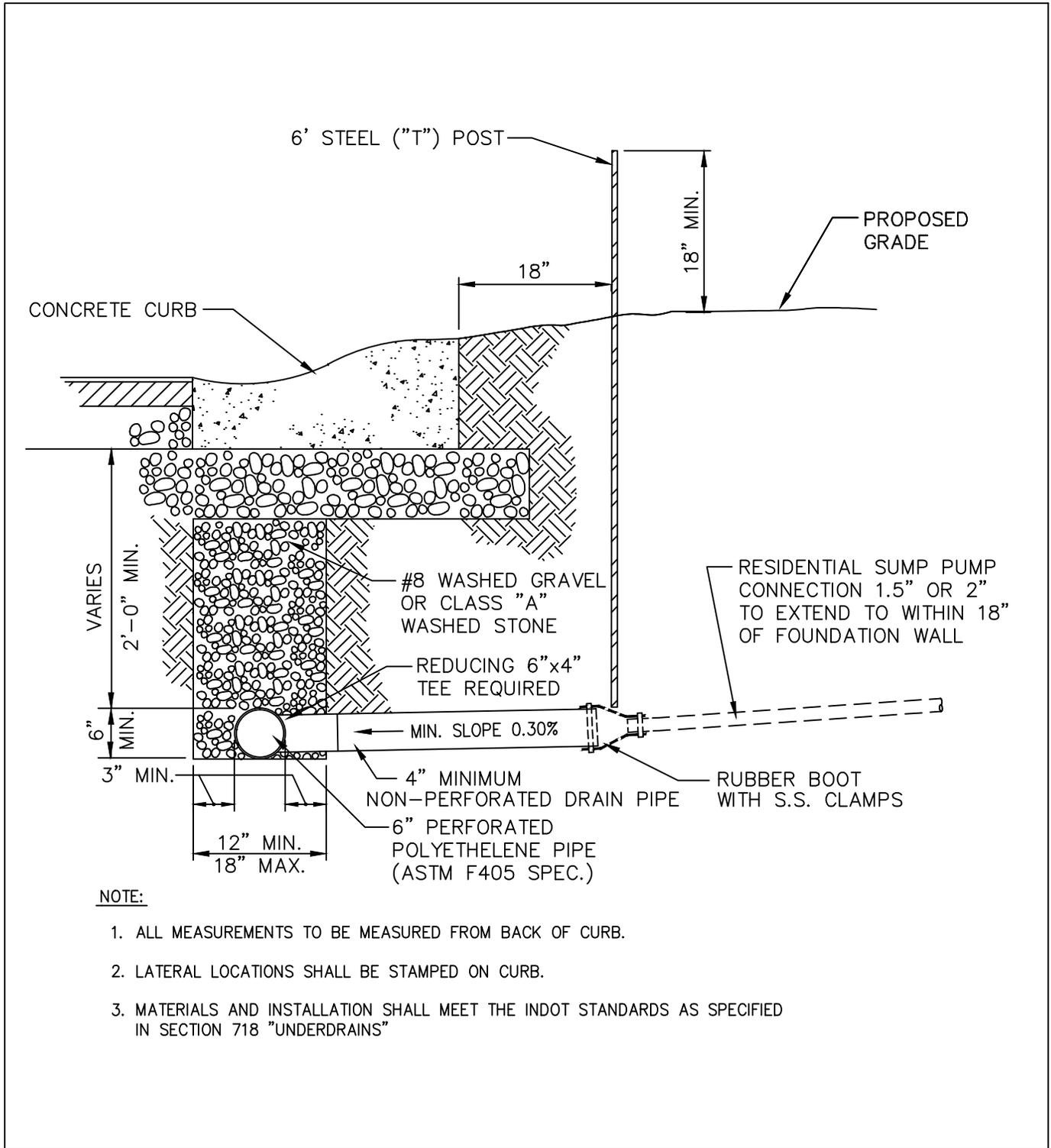
CITY OF WESTFIELD, INDIANA



*Neil B. Vantrees*

4/1/13  
DATE

FIGURE P-9



## UNDERDRAIN DETAIL

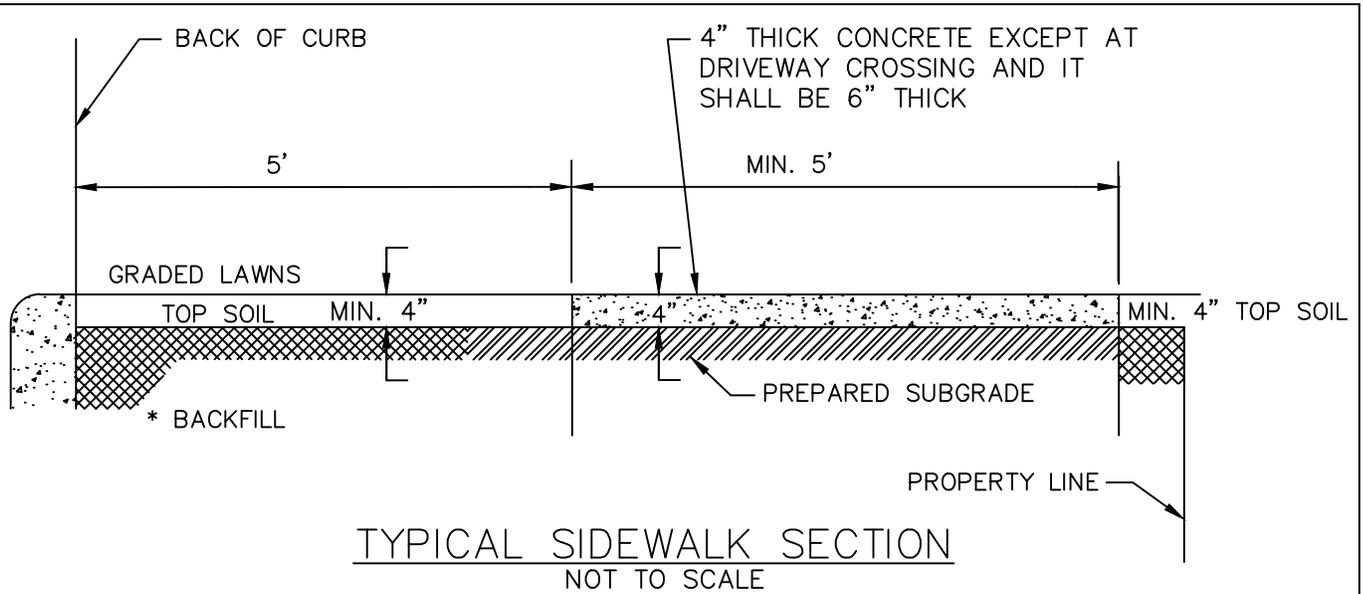


CITY OF WESTFIELD, INDIANA

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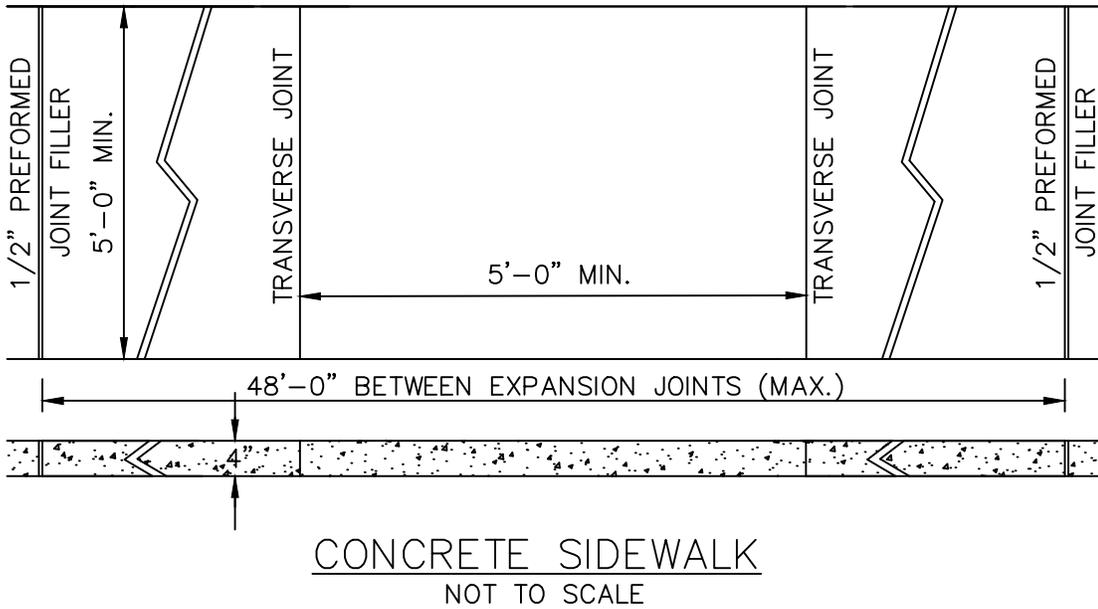
4/1/13  
DATE

FIGURE P-9a



\* THE SPACE BEHIND THE CURB SHALL BE FILLED WITH SUITABLE MATERIAL TO THE REQUIRED ELEVATION AND COMPACTED IN LAYERS NOT TO EXCEED 6" IN DEPTH.

SUBGRADE UNDER ALL CURBS, SIDEWALKS, AND DRIVES SHALL BE COMPACTED IN ACCORDANCE WITH I.N.D.O.T. SPECIFICATIONS.



SIDEWALK DETAILS



CITY OF WESTFIELD, INDIANA

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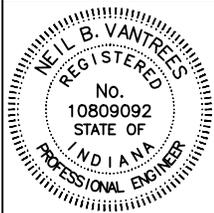
FIGURE P-10

## SIDEWALK CURB RAMP NOTES

THE CITY OF WESTFIELD FOLLOWS THE INDOT GUIDELINES FOR SIDEWALK RAMPS.  
THE LIST OF DETAILS BELOW CAN BE FOUND ON THE INDOT WEBSITE:  
<http://www.in.gov/dot/div/contracts/standards/drawings/sep13/e/sep600.htm>

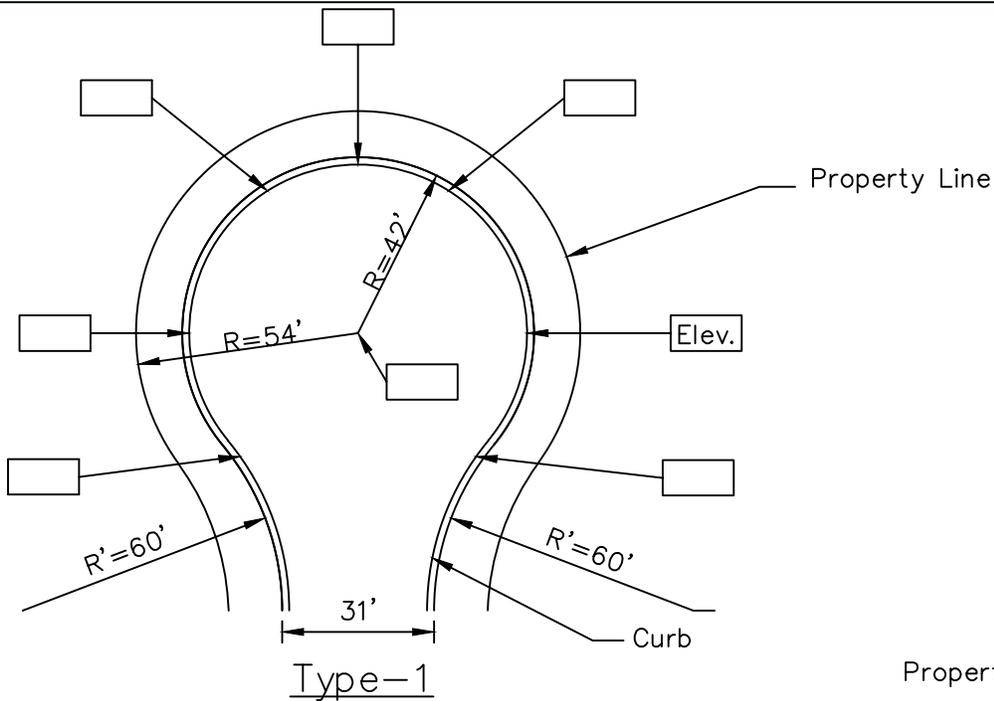
- E 604-SWCR-01 Location Plan for Sidewalk Curb Ramps (eff. 09/01/05)
- E 604-SWCR-02 Sidewalk Curb Ramps General Notes & Details (eff. 09/01/05)
- E 604-SWCR-03 Sidewalk Curb Ramp Type A (eff. 09/01/05)
- E 604-SWCR-04 Sidewalk Curb Ramp Type B (eff. 09/01/05)
- E 604-SWCR-05 Sidewalk Curb Ramp Type C (eff. 09/01/05)
- E 604-SWCR-06 Sidewalk Curb Ramp Type D (eff. 09/01/05)
- E 604-SWCR-07 Sidewalk Curb Ramp Type E (eff. 09/01/05)
- E 604-SWCR-08 Sidewalk Curb Ramp Type F (eff. 09/01/05)
- E 604-SWCR-09 Sidewalk Curb Ramps Type G & H (eff. 09/01/05)
- E 604-SWCR-10 Sidewalk Curb Ramp Type K (eff. 09/01/05)
- E 604-SWCR-11 Sidewalk Curb Ramp Type L (eff. 09/01/05)
- E 604-SWCR-12 Sidewalk Curb Ramp Improved Access (eff. 09/01/05)
- E 604-SWCR-13 Sidewalk Curb Ramp Quantity Estimate (eff. 09/01/05)

## SIDEWALK CURB RAMP NOTES



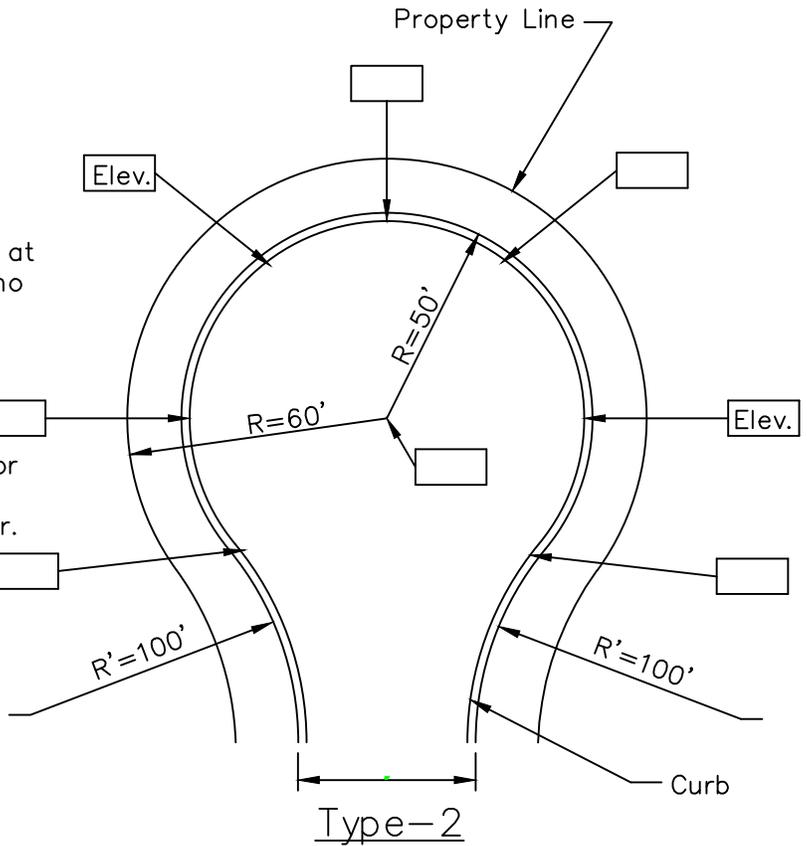
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DATE



GENERAL NOTES:

1. Type-1 shall be used only in Local subdivisions; all other use Type-2.
2. Warning signs shall be posted at entrance to street, indicating no outlet.
3. Detail shall be identified by street name.
4. Elevations provided shall be proposed flow line of gutter.
5. One detail shall be provided for each cul-de-sac.
6. Scale shall be 1"=40' or larger.
7. Cul-de-sac length shall be a maximum of 600 feet, see section 02501 of the standard specification



CUL-DE-SAC DETAIL

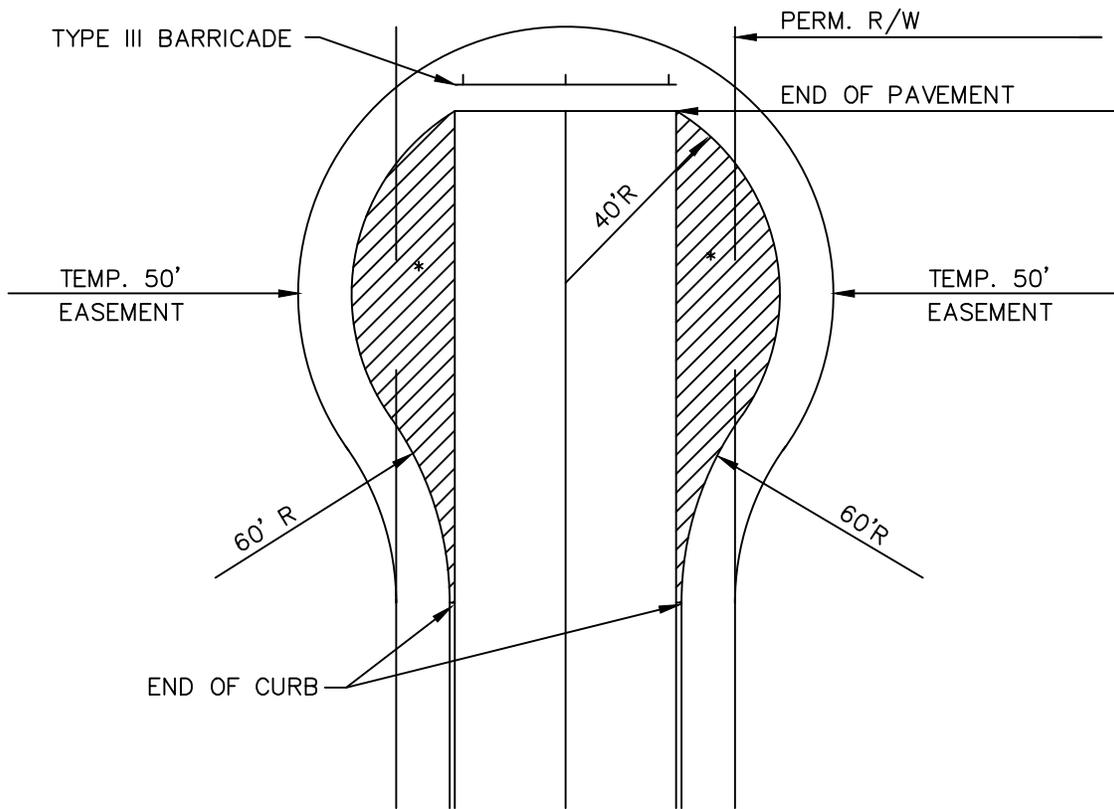


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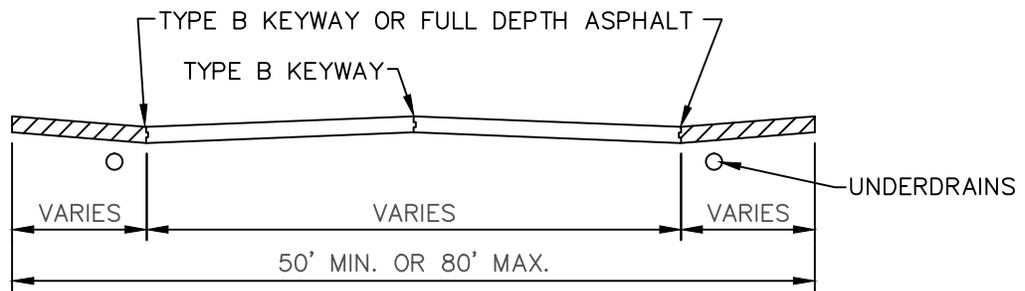
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4/1/14  
DATE

FIGURE P-12



\* TO BE REMOVED WHEN THE STREET IS CONTINUED.  
THICKNESS AND TYPE TO MATCH PERMANENT PAVEMENT.



NOT TO SCALE

## SUBDIVISION TEMPORARY CUL-DE-SAC

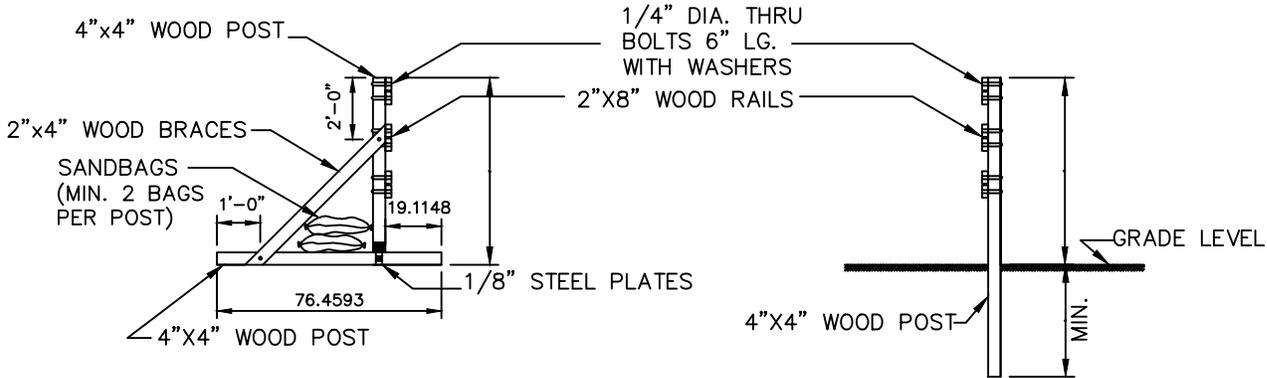
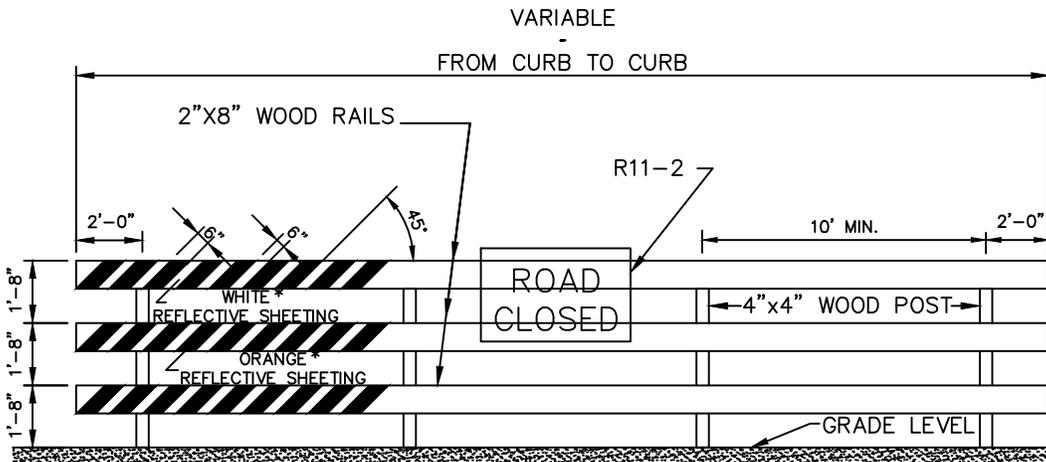


CITY OF WESTFIELD, INDIANA

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FIGURE P-13

RESIDENTIAL STREETS ONLY



- ① ALL WOOD POST AND SUPPORT MEMBERS SHALL BE PAINTED WITH TWO (2) COATS OF WHITE PAINT.
- ② LOCATION OF BARRICADE AS PER PLANS.
- ③ \*REFLECTIVE SHEETING TO BE IN ACCORDANCE WITH I.N.D.O.T. STANDARD SPECIFICATIONS.
- ④ REFER TO SECTION 801 OF THE INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS AND LATEST ADDITION OF INDIANA MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
- ⑤ WHEN THE PROPOSED EXTENSION OF THE STREET IS TO BE a) LESS THAN TWO (2) YEARS USE THE SANDBAGS ON POSTS b) GREATER THAN TWO (2) YEARS USE THE GROUND POSTS.

STANDARD BARRICADE



CITY OF WESTFIELD, INDIANA

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DATE

**High Intensity, Prismatic Reflective Sheeting**

INDOT Standard Specifications (2014)  
Section 913 Miscellaneous. 919.01 (3a) Traffic signs reflective Sheeting, Encapsulated Lens.

MATERIAL: Traffic Signs fabricated from 3-M (or other INDOT approved) reflective sheeting,  
High Intensity, Prismatic ASTM Type IV on aluminum backing

3930 - White (INDOT approval #W088801)  
3932 - Red (INDOT approval #W088803)  
3935 - Blue (INDOT approval #W088804)  
3939 - Brown (INDOT approval #W128801)

3931 - Yellow (INDOT approval #W088802)  
3934 - Orange (INDOT approval #W058802)  
3937 - Green (INDOT approval #W058805)

**Diamond Grade Reflective Sheeting**

INDOT Standard Specifications (2014)  
Section 919 - Traffic Signs: 919.01 (3a) Traffic signs reflective Sheeting, Encapsulated Lens

MATERIAL: Traffic Signs fabricated from 3-M (or other INDOT approved) reflective sheeting,  
Diamond grade ASTM Type IX on aluminum backing

4084 - Fluorescent Orange (INDOT Approval # W068893)  
4091 - Yellow (INDOT Approval # W088891)  
4095 - Blue (INDOT Approval # W088893)  
4097 - Green (INDOT Approval # W088895)

4090 - White (INDOT Approval # W088890)  
4092 - Red (INDOT Approval # W088892)  
4096 - Worboy Green (INDOT Approval #W088894)

MATERIAL: Traffic Signs fabricated from 3-M reflective sheeting, Diamond grade ASTM Type XI on aluminum backing

4081 - Fluorescent Yellow (INDOT Approval # W088896)  
4083 - Fluorescent Yellow/Green (INDOT Approval # W088897)

**Aluminum Backing Material**

INDOT Standard Specifications (2014)  
Section 919 - Street Signs: 919.01 (a) Traffic Signs Sheet Signs

GENERAL STREET NAME SIGN NOTES

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE FINAL STREET SIGN LEGEND AND BACKGROUND COLOR WITH THE CITY BEFORE ORDERING AND INSTALLING STREET NAME SIGNS.
2. STREET NAME SIGNS WILL MEET THE MINIMUM STANDARDS SPECIFIED IN THE INDIANA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND THE FEDERAL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES UNLESS OTHERWISE STATED.
3. ALUMINUM BACKING MATERIAL WILL COMPLY WITH INDOT STANDARD SPECIFICATIONS (2014) SECTION 919 - STREET SIGNS: 919.01 (a) TRAFFIC SIGNS SHEET SIGNS.
4. INSTALL GROUND-MOUNTED SIGNS PER STANDARD DWG RD-35 AND OVERHEAD SIGNS PER INDOT STANDARD DWGS.
5. LONGER SIGN LENGTHS WILL REQUIRE SPECIAL SIGN SUPPORTS AND APPROVAL BY THE CITY ENGINEER

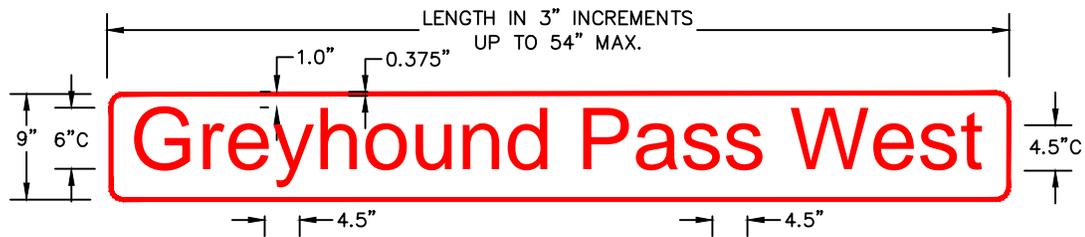
**STREET SIGN MATERIAL DETAIL**



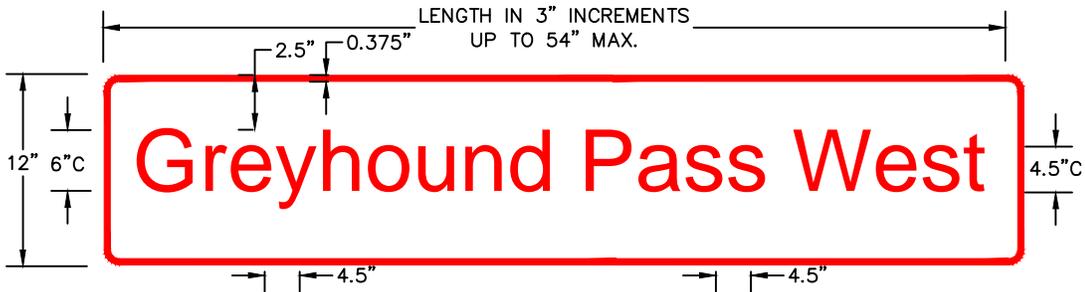
CITY OF WESTFIELD, INDIANA

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DATE FIGURE P-15a



Subdivisions & Local Roads  
with Speeds 25mph or Less



Collector and Arterial Streets with  
Speeds Greater Than 25mph

High Intensity, Prismatic Reflective Sheeting

INDOT Standard Specifications (2014)

Section 919 - Traffic Signs: 919.01 (3a) Traffic Signs Reflective Sheeting, Encapsulated Lens.

MATERIAL: Traffic Signs fabricated from 3-M (or other INDOT approved) reflective sheeting,  
High Intensity, Prismatic ASTM Type IV on aluminum backing

3930 - White (INDOT approval #W088801)  
3935 - Blue (INDOT approval #W088804)  
3939 - Brown (INDOT approval #W128801)

3932 - Red (INDOT approval #W088803)  
3937 - Green (INDOT approval #W058805)

GENERAL STREET NAME SIGN NOTES

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE FINAL STREET SIGN LEGEND AND BACKGROUND COLOR WITH THE CITY BEFORE ORDERING AND INSTALLING STREET NAME SIGNS.
2. STREET NAME SIGNS WILL MEET THE MINIMUM STANDARDS SPECIFIED IN THE INDIANA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND THE FEDERAL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES UNLESS OTHERWISE STATED.
3. ALUMINUM BACKING MATERIAL WILL COMPLY WITH INDOT STANDARD SPECIFICATIONS (2014) SECTION 919 - STREET SIGNS: 919.01 (a) TRAFFIC SIGNS SHEET SIGNS.
4. INSTALL GROUND-MOUNTED SIGNS PER STANDARD DWG RD-35 AND OVERHEAD SIGNS PER INDOT STANDARD DWGS.
5. LONGER SIGN LENGTHS WILL REQUIRE SPECIAL SIGN SUPPORTS AND APPROVAL BY THE CITY ENGINEER

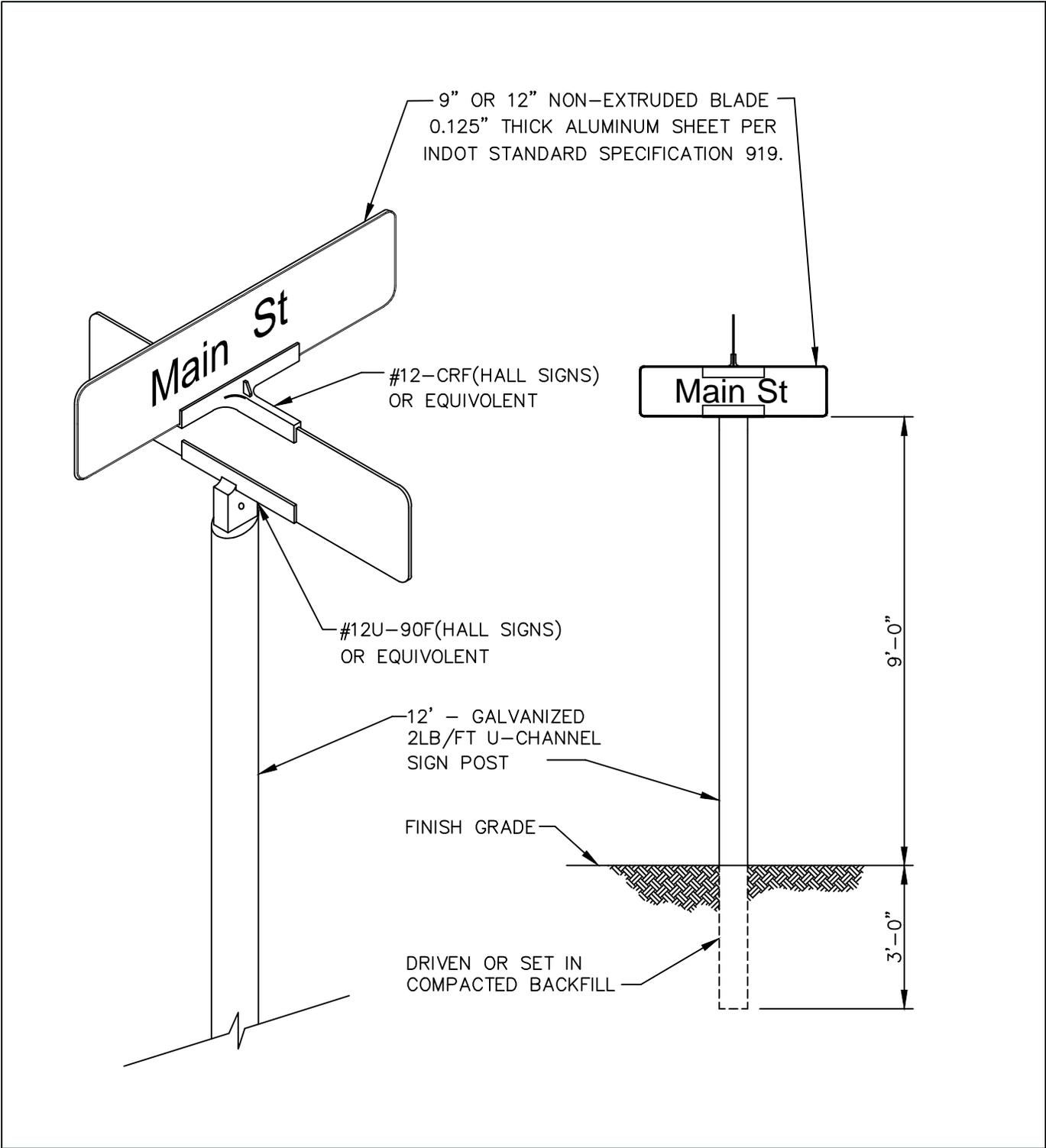
STREET NAME SIGN DETAIL



CITY OF WESTFIELD, INDIANA

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DATE FIGURE P-15b



STREET NAME SIGN DETAIL

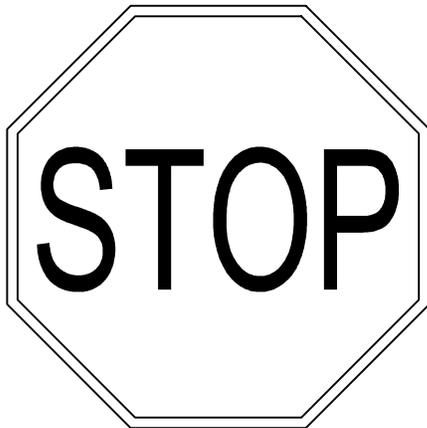


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FIGURE P-15c



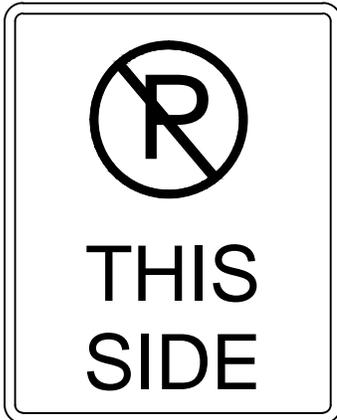
STOP SIGN (R1-1)  
30" x 30"



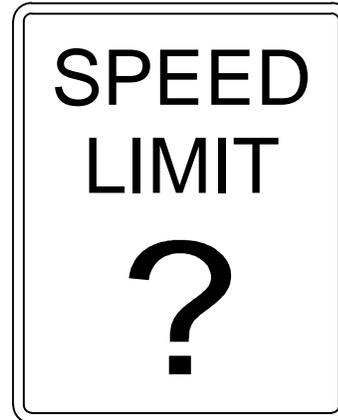
YIELD SIGN (R1-2)  
30" x 30" x 30"



R1-4  
18" x 6"



NO PARKING SIGN (R7-31)  
12" x 18"



SPEED LIMIT SIGN (R2-1)  
24" x 30"

NOTES:

- 1.SIGNS SHALL BE SINGLE FACED WITH HIGH INTENSITY REFLECTORIZED SHEETING ON 0.080" THICK ALUMINUM SHEET MATERIAL PER INDOT STANDARD SPECIFICATION 919.
- 2.POSTS SHALL BE 12'-0" LONG, 2lb/ft GALVANIZED U-CHANNEL SIGN POST INDOT STANDARD SPECIFICATION 910.14.
- 3.ALL SIGNS, 36" AND GREATER, SHALL BE; DOUBLE POSTED, 14'-0" LONG, 3lb/ft GALVENIZED U-CHANNEL POST, PER INDOT STANDARD SPECIFICATION 910.14.
- 4.ALL SIGN SIZES, SHAPES, COLORS AND MATERIAL SHALL MEET THE INDIANA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

REGULATORY SIGN DETAIL

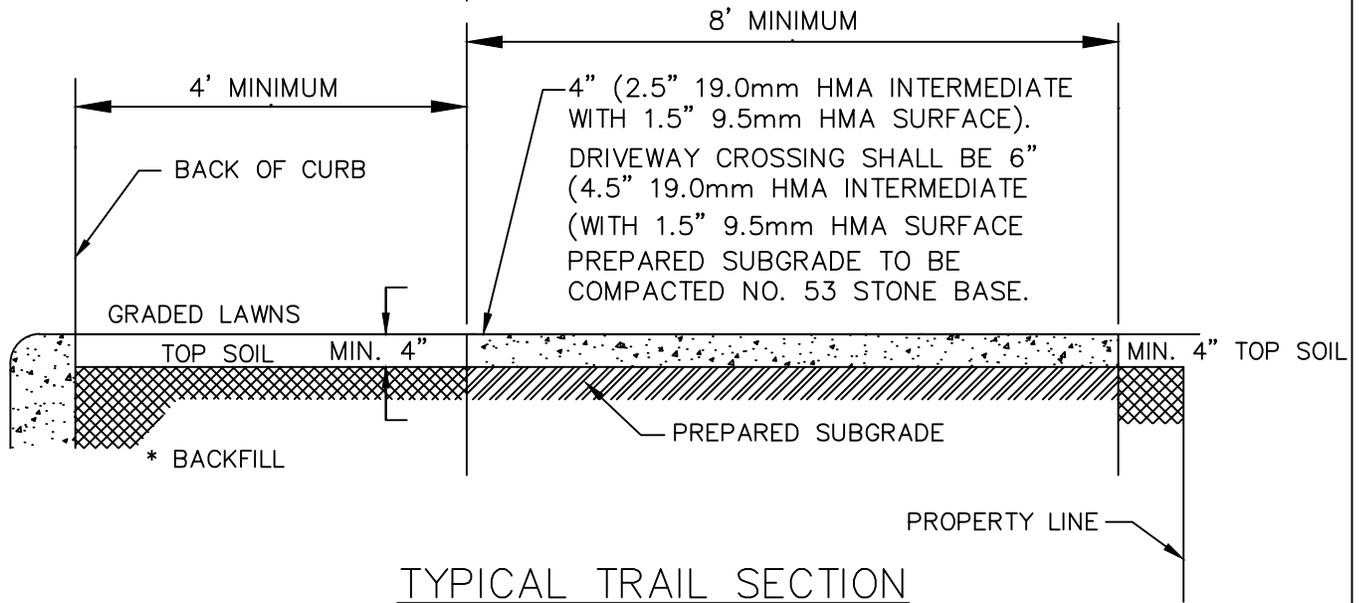


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4/1/13  
DATE

FIGURE P-15d



TYPICAL TRAIL SECTION  
NOT TO SCALE

\* THE SPACE BEHIND THE CURB SHALL BE FILLED WITH SUITABLE MATERIAL TO THE REQUIRED ELEVATION AND COMPACTED IN LAYERS NOT TO EXCEED 6" IN DEPTH.

SUBGRADE UNDER ALL CURBS, SIDEWALKS, PATHS AND DRIVES SHALL BE COMPACTED IN ACCORDANCE WITH I.N.D.O.T. SPECIFICATIONS.

SEE SECTION 02502 (STANDARDS FOR ROADWAY CONSTRUCTION) FOR DETAILED DISCRPTION OF BICYCLE/JOGGING TRAIL CONSTRUCTION

BICYCLE/JOGGING TRAIL DETAIL

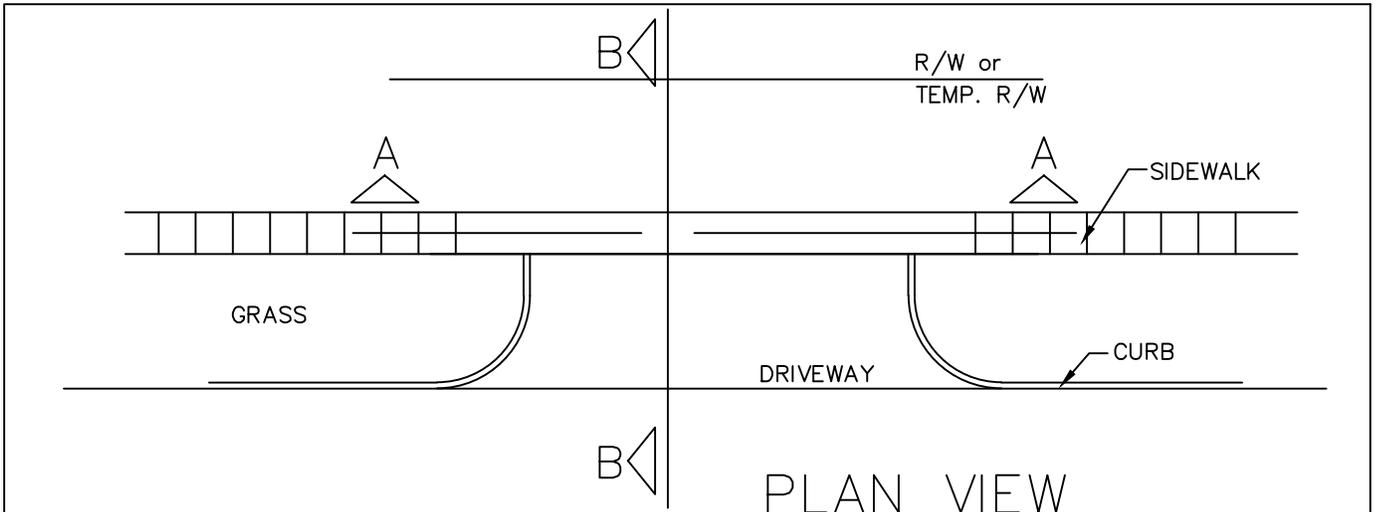


CITY OF WESTFIELD, INDIANA

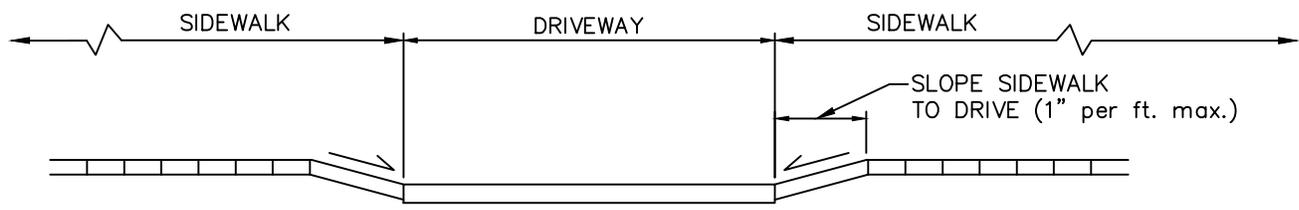
*Neil B. Vantrees*

4/1/14  
DATE

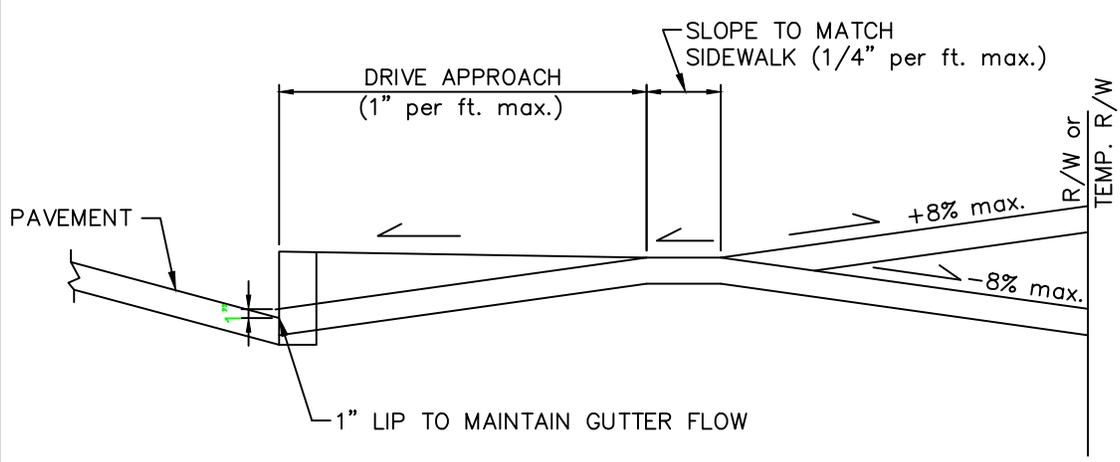
FIGURE P-16



PLAN VIEW

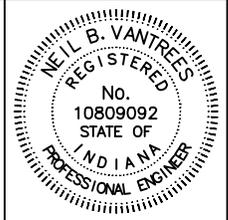


SECT. A-A



SECT. B-B

TYPICAL DRIVEWAY SECTION



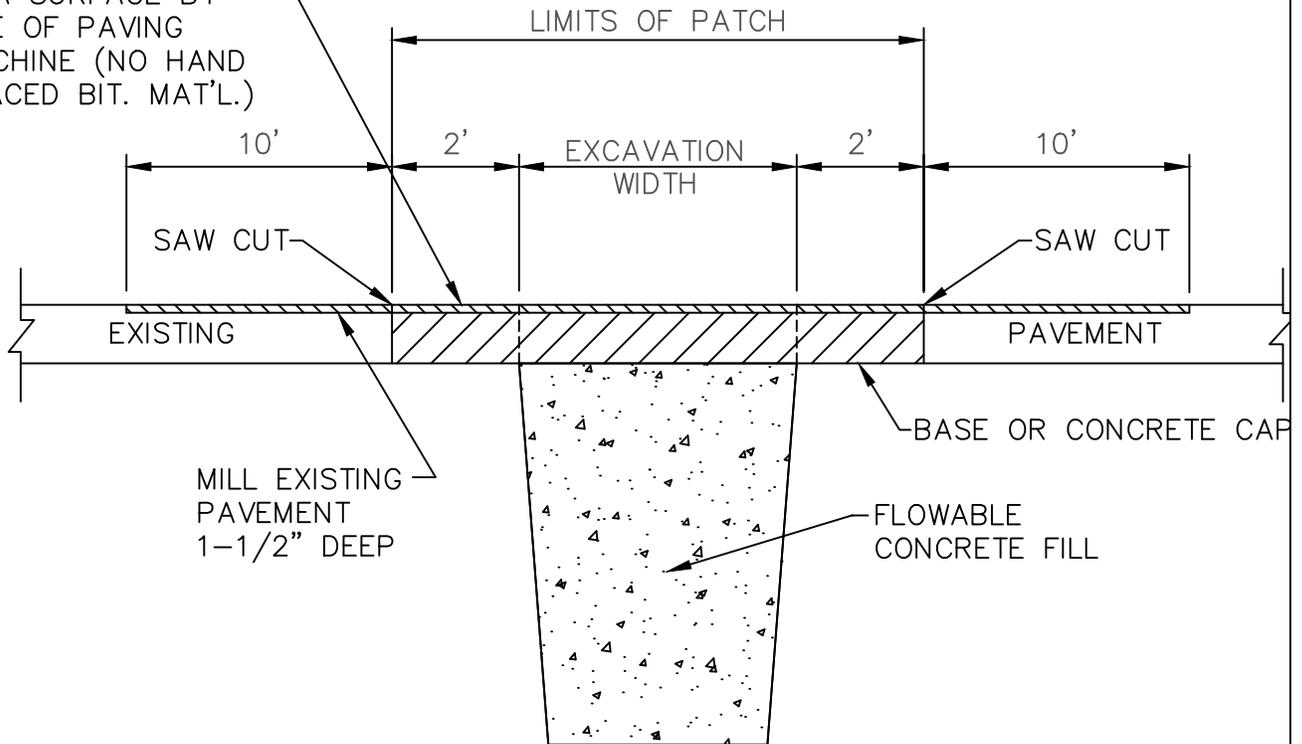
CITY OF WESTFIELD, INDIANA

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DATE

FIGURE P-17

PLACE MIN. 1-1/2" HMA SURFACE BY USE OF PAVING MACHINE (NO HAND PLACED BIT. MAT'L.)



## GENERAL DETAIL

NOTES:

1. SAW CUT 1/3 PAVEMENT THICKNESS THEN BREAK OUT.

NOT TO SCALE

### REPAIR CUTS WITHIN PAVEMENT LIMITS



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DATE

FIGURE P-19