

SECTION 02502 - STANDARDS OF ROADWAY CONSTRUCTION

PART 1 - GENERAL

1.1 Road construction shall conform to the following requirements and standards:

A. Streets, General

1. Streets and alleys 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 Section 02500 and the Indiana Department of Transportation (INDOT) Standard Specifications.
2. Prior to placing the street and alley surfaces, adequate subsurface drainage (underdrains) for the street shall be provided by the subdivider. Underdrain pipe shall conform to Section 02500 and the INDOT Standard Specifications.
3. Concrete and bituminous asphalt paving mixes shall comply with specifications contained in Section 02500.
4. Before any bond covering a street installation is released, the Westfield Public Works Director or duly authorized representative may request that core borings of the street be provided, at the subdivider's expense, for thickness and/or compaction determination.
5. Prior to the acceptance of asphalt streets, the subdivider shall employ and pay for the services of an independent testing laboratory to take cores at selected locations and perform Marshall stability, flow and density test, and percent of compaction determination on completed asphalt work if so directed by the Westfield Public Works Director or duly authorized representative.
6. Prior to acceptance of concrete streets, subdividers must provide satisfactory test results from an independent testing laboratory to the Westfield Public Works Director or duly authorized representative
7. A developer may request permission from the Westfield Public Works Director to delay the installation of the 1-inch surface layer of asphalt until the binder layer of asphalt has had sufficient time to prove its durability under the stress of heavy construction traffic, but not to exceed one (1) year. The developer shall be required to submit a separate performance bond to cover the cost of the installation of the 1-inch surface layer of asphalt.
8. All traffic control devices shall comply with guidelines and requirements of the current edition of the Indiana Manual on Uniform Traffic Control Devices.

B. Subgrade for Street Pavements

1. Preparation

- a. After all earth work is substantially complete and all drains installed, the subgrade shall be brought to the lines and grades shown on the plans.
- b. Unless otherwise provided, the upper six (6) inches of all subgrade shall be uniformly compacted to at least 95 percent standard density as determined by the provisions of AASHTO, T99, "Compaction and Density of Soils". During subgrade preparation and after its completion, adequate drainage shall be provided at all times to prevent water from standing on the subgrade. Subgrades shall be so constructed that it will have uniform density throughout. After compaction and final grading, the subgrade shall be finished with a three-wheel roller weighting not less than ten (10) tons. For areas not accessible to the roller, the required compaction shall be obtained by using mechanical tampers.
- c. All soft yielding or otherwise unsuitable material which will not compact properly shall be removed. All rock encountered shall either be removed or broken off to conform with required cross sections. Any holes or depressions resulting from the removal of such unsuitable material shall be filled with approved material and compacted to conform with the surrounding subgrade surface. No placement of pavement shall be permitted on uninspected or unapproved subgrade and, at no time, when the subgrade is frozen or muddy. No hauling shall be done nor equipment moved over the subgrade when its condition is such that undue distortion results. If these conditions are present, the subgrade shall be protected with adequate plank runways, mats, or other satisfactory means if hauling is to be done thereon.
- d. The subgrade shall be prepared sufficiently in advance to facilitate proper inspection of final elevations and compactions by the Westfield Public Works Director or duly authorized representative.
- e. All utility and drainage excavations under pavement shall be backfilled with flowable fill. These locations shall be illustrated on construction drawings submitted to the Westfield Department of Public Works.

2. Rigid Pavement Construction - When concrete is placed, the subgrade shall be properly dampened. Concrete pavement shall be

constructed in accordance with Section 02500 and INDOT Standard Specifications.

- C. Pavement Section - Typical pavement sections shall conform to the cross sections shown by Figures P-1 through P-3. The use of alternative cross sections shall be approved by the Westfield Public Works Director.
- D. Curbs and Gutters
 - 1. Developers shall provide curbs and gutters on each side of the street in proposed development.
 - 2. Curbs and gutters shall comply with standard details shown by Figure P-8. As an alternate, curb sections which comply with INDOT standard details will be permitted upon approval of the Westfield Department of Public Works.
 - 3. All curb and gutter sections placed on Primary Arterials, Secondary Arterials, or Collectors shall be of the barrier type. Roll-type curb and gutter sections will be permitted for Local Roads and Streets.
 - 4. Curbs and gutters shall be constructed according to Section 02500:
 - a. The minimum grade of any street gutter shall be not less than three-tenths percent (0.3%).
 - b. Inlet grates shall be heavy duty type recommended for bicycle traffic. Reference Section 2721.
- E. Sidewalks, Pedestrian Paths, Jogging Paths, and Bicycle Paths
 - 1. Sidewalks shall be at least six (6) inches thick at drives and at least four (4) inches thick at all other locations. Sidewalks shall be at least five (5) feet wide adjacent to Primary Arterials, Secondary Arterials, Collectors and in commercial, industrial or multi-family developments. Sidewalks shall be at least five (5) feet wide at all other locations. Sidewalks shall be concrete in accordance with Section 02500. Expansion joints shall be located every 48 feet and control joints every six (6) feet.
 - 2. Curb ramps shall comply with the most current INDOT and ADA requirements.
 - 3. Pedestrian paths, other than sidewalks, shall be constructed to a minimum width of five (5) Feet. The paths shall be constructed of asphalt, crushed stone, bark chips, paving stones, or other similar surface material.
 - 4. Bicycle ways/jogging paths shall be constructed to a minimum width of eight (8) feet with a maximum grade of eight percent (8%). The ways/paths shall be constructed of concrete or asphalt. Concrete ways/paths shall be at least four (4) inches thick and shall

include wire fabric reinforcing of a size "6 x 6 - W2 x W2".
Asphalt ways/paths shall be constructed using the following as a minimum requirement:

- a. Four (4) inches Compacted Aggregate Size No. 53, stone base
 - b. Two (2) inches Bituminous Binder No. 8 or 9
 - c. One (1) inch Bituminous Surface No. 11
5. All ways/paths shall be placed on properly prepared and compacted subgrades. Materials shall be furnished and installed in accordance with Section 02500 and INDOT Standard Specifications.
 6. When sidewalks or pathways cross major street intersections within or adjacent to a subdivision, necessary traffic control devices such as painted crosswalks and signs shall be installed at the subdivider's expense at the discretion of the Westfield Town Council or the Westfield Public Works Director or designee.
 7. If not located within public rights-of-way, easements of at least ten (10) feet in width shall be provided for sidewalks, pedestrian paths, or bicycle paths.
- F. Easements - Whenever possible, easements for poles or underground conduits for electrical power, or telephone lines shall be provided along rear lot lines.
- G. Plans - Construction plans for improvements to be installed shall be furnished in accordance with the specifications of the Westfield Department of Public Works and/or, when appropriate, to the Hamilton County Highway Department. Such plans must receive all appropriate approvals before improvements are installed. Upon completion of streets and alleys improvements, as-built plans shall be filed with the Westfield Department of Public Works and when appropriate, to the proper governing body of Hamilton County. All construction plans shall include the following:
1. Horizontal geometry of each proposed street, with centerline and curb radii shown.
 2. The profile of each proposed street, with grades indicated, and lengths of vertical curves.
 3. The cross-section of each proposed street, showing the width of pavement, the location and width of sidewalks, and the location and size of utility mains.
- H. Inspection - Prior to starting any construction, arrangements shall be made for inspection of work to ensure compliance with plans and specifications

approved by the Westfield Department of Public Works or, when appropriate, the Hamilton County Highway Department.

- I. All construction must be approved by the Westfield Public Works Director and notice of construction must be given to the Westfield Public Works Director, or duly authorized representative, 48 hours prior to beginning work.
 - J. Allowable Modifications - Where unusual or exceptional factors or conditions exist, the Westfield Department of Public Works may allow minor modifications of any provision of this Section. When such modifications are allowed, a detailed written statement of the reasons for such modifications shall be attached to all copies of construction plans.
- 1.2 For pedestrian trails located on the Monon Trail and Midland Trace Trail systems.
- A. Definitions
 - 1. Accessible Route – A continuous unobstructed path connecting all accessible elements and spaces of a building or facility. Exterior accessible routes may include parking access aisles, curb ramps, crosswalks at vehicular ways, walks, ramps, an lifts.
 - 2. Outdoor Access Route – A continuous unobstructed path designated for pedestrian use that connects accessible elements within a picnic area, camping area, or designated trailhead.
 - 3. Trail – A route designed, designated, or constructed for recreational pedestrian use or provided as a pedestrian alternative to vehicular routes within a transportation system.
 - 4. Designated Trailhead – A designated point of access that may contain a parking area, information kiosks, restrooms, water hydrants, and may be reached by vehicular or pedestrian access.
 - B. General
 - 1. Prior to the acceptance of asphalt trails, the subdivider shall employ and pay for the services of an independent testing laboratory to take cores at selected locations and perform Marshall stability, flow and density test, and percent of compaction determination on completed asphalt work if so directed by the Westfield Public Works Director or duly authorized representative.
 - 2. Prior to acceptance of concrete streets, subdividers must provide satisfactory test results from an independent testing laboratory to the Westfield Public Works Director or duly authorized representative

3. All work shall comply with Town Requirements as listed in Section 02500, Parts 1.1, 1.2, and 1.3.
- C. Design Speed
1. The minimum design speed for these trails is 20 mph.
- D. Trail Slopes
1. Cross Slope = 2% Max.
 2. Running Slope
 - a. 8.33% slope for 300 feet
 - b. 10% Slope for 30 feet
 - c. 12% Slope for 10 feet
 - d. No more than 30% of the trail length shall exceed 1:12 (8.33% Slope)
- E. Resting Intervals
1. Occurrence
 - a. At intervals no greater than permitted by running slope
 - b. 60" (5 feet) length minimum
 - c. less than 1:20 (5%) Slope
 - d. As wide as the widest trail segment adjacent to it.
- F. Typical Multi-Use Trail Section
1. Asphalt Surface
 - a. 110#/SYS HMA, Type A, Surface 9.5mm
 - b. 220#/SYS HMA, Type A, Intermediate, 19.0mm
 - c. 4" Compacted Aggregate Base, No. 53
 - d. Trail Width
 - e. 12 feet
 2. Shoulders
 - a. 4 foot desirable
 - b. 2 foot minimum
 3. Side Slopes
 - a. Cut = 3:1 (2:1 Maximum with Railing)
 - b. Fill = 3:1 (2:1 Maximum with Railing)
- G. Typical Equestrian Trail Section
1. Stone Surface
 - a. 8" Compacted Aggregate Base, No. 53
 2. Trail Width

- a. 10 feet
 - 3. Shoulders
 - a. Side Slopes
 - b. Cut = 3:1
 - c. Fill = 3:1

- H. Obstruction Free Zone
 - 1. 3 feet Minimum
 - 2. Less requires adequate physical barrier

- I. Horizontal Control
 - 1. Minimum Radius = 100 feet

- J. Vertical Control
 - 1. Vertical Curve – Minimum Length
 - 2. 60 feet (3 x design speed)

- K. K Values: Stopping Sight Distance
 - 1. Crest = 7 (minimum)
 - 2. Sag = 17 (minimum)

- L. Signage
 - 1. Roadway
 - a. Sign Type W11-2, (500 feet from cross walk)
 - b. Sign Type W16-2 with W11-2
 - c. Sign Type W11A-2, 500 feet from cross walk
 - d. Pavement message marking “XING 100 feet from W11A-2
 - e. Pavement message marking “PED” 40 feet from “XING”
 - f. Signs W11-2, W11A-2, and W16-2 shall be fluorescent yellow-green, diamond grade.
 - 2. Pathway
 - a. “Stop” (R1-1) at 10 feet from edge of street
 - b. “No Motor Vehicles” (R5-3) with R1-1
 - c. “Cross Traffic Does Not Stop” (W4-4P) with R1-1
 - d. “Stop Ahead” (W3-1) 150 feet from “Stop” (R1-1) sign
 - e. Warning Signs (i.e., curve ahead) 100 feet from hazard condition

- f. "Pavement Ends" 150 feet from end of trail

M. Road Crossings

- 1. Type 1
 - a. Judgment based on traffic, clear zone, visibility
 - b. Rural Local Roads, Urban Local Streets
 - c. Trail Warning Signs: "STOP", "STOP AHEAD"
 - d. Crosswalk pavement markings at crossing point
- 2. Type 2
 - a. Judgment based on traffic, clear zone, visibility
 - b. Rural Arterials, Rural Collectors, Two-Lane Urban Arterials, Urban Collectors
 - c. All treatments of Type 1 Road Crossing apply
 - d. Overhead Flashing Yellow Warning Signal
- 3. Type 3
 - a. Judgment based on traffic, clear zone, visibility
 - b. Multi-Lane Urban Arterials
 - c. All treatments of Type 1 and Type 2 Road Crossing apply
 - d. Refuge Island

N. Curb Ramps

- 1. 1:12 Slope
- 2. Flared sides if traffic must walk across, slope flared at 10:1
- 3. If ramp has less than 48 inches of walk behind it, flared sides must be 1:12
- 4. Becomes a standard ramp if more than a 6" vertical change
- 5. 2 foot flat area at intersections

O. State Highway Crossing

- 1. Case by case basis
- 2. MUTCD
- 3. Acceptable gaps
- 4. Must be coordinated with INDOT

P. Path in Road Right-of-Way

- 1. 5 feet separation from edge of path pavement to edge of road
- 2. Less than 5 feet requires suitable physical barrier
 - a. 6" curb with wood railing

- b. Guardrail and wood railing, with no curb or mountable curb (4")
 - 3. Clear Zone Requirements
 - a. 18" clear zone minimum for obstructions in ROW
 - b. Shy lines for guardrails
- Q. Unpaved Road Crossings
 - 1. Pave 10 feet on either side of trail to reduce gravel on trail.
- R. Overhead Vertical Clearance
 - 1. 10 feet
- S. Edge Protection for Slopes
 - 1. Required where there is less than 5 feet of separation from edge of path to top of slope and the slope is greater than 3:1
 - 2. Drop offs greater than 2 feet and within 5 feet of edge of trail.
 - 3. Location should be at edge of the shoulder.
- T. Bollards
 - 1. At road crossings
 - 2. Permanently reflectorized and brightly painted
 - 3. Collapsible
 - 4. Out of roadway clear zone
 - 5. Installed in center of bike path with envelope painted around it.
 - 6. If more than 1, there should be an odd number at a 5 foot spacing.
- U. Bridges
 - 1. Clear Width
 - a. As wide as the widest approach trail width plus the minimum 2 foot wide clear areas.
 - b. Minimum 10 feet.
 - 2. Railing
 - a. 54 inches in height
 - b. Design loading shall be $W=50$ pounds per linear foot transversely and vertically, acting simultaneously on each rail.
 - 3. Opening in Horizontal Railing Elements
 - a. Lower 27 inches shall not allow a 6" diameter sphere to pass through

- b. Above 27 inches shall not allow a 8” diameter sphere to pass through
 - 4. Approach Railing
 - a. 42’-2” in length
 - b. Step down in height
 - 5. Decking
 - a. Structural concrete slab
 - b. Timber decking
 - c. Simulated Wood Products. Alternatives must be sent to Public Works and Parks Department for evaluation. These alternatives must also be accompanied by a data sheet, provided by the manufacturer, stating that the product is designed for the proposed use.
- V. Overlooks and viewing areas
- 1. Maneuvering space of
 - a. 60” diameter
 - b. 1:50 (2% slope) Maximum in any direction
 - 2. Unrestricted viewing area
 - a. Accommodates eye level between 32” minimum and 51” maximum
- W. Railroads
- 1. Crossings
 - a. Geometry
 - Optimal is 90 degrees to the rail
 - Minimum is 45 degrees to the rail, and may require widened shoulder
 - b. Signage
 - Rail warning sign (W10-1) 115 feet from nearest rail
 - Crossbuck (R15-8) 15 feet from the nearest rail
 - If more than one track, R15-2 with R15-1
 - 24” Stop Bar (pavement marking) 15 feet from the nearest rail (with R15-1)
 - Railroad pavement message marking 65 feet from the nearest rail
 - Where existing arms exist (at road crossings) a new pedestrian gate shall be placed if the path must go outside the existing post.

- c. Crossing Materials
 - Optimal material is rubber panel or concrete
 - Asphalt (with formed flangeway) or wood can be used
 - Surface shall be level and flush with the rail top at the outer edge and between the rails except for a maximum 2-1/2" gap on the inner edge of each rail to permit passage of wheel flanges.

2. Corridors

- a. Low Speed / Low Density Rail
 - Recommended Separation: 20 feet or more
 - Minimum separation: 10 feet with fence or other separation technique
- b. Medium Speed / Medium Density
 - Recommended Separation: 25 feet or more
 - Minimum Separation: 15 feet with fence or other separation technique
- c. High Speed / High Density
 - Recommended Separation: 25 feet or more, with fence or other separation technique
 - Minimum Separation: 15 feet with adequate separation technique

X. Hydraulics

1. Culvert Design – Pathway

- a. Type 3 Pipe
- b. Design Storm Frequency
 - Backwater: Q_{100} with trail overflow
 - Serviceability: $Q_{10} = 1'$ below edge of pavement
 - Allowable Velocity: Q_{10}

PART 2 - PRODUCT

Not Applicable

PART 3 - EXECUTION

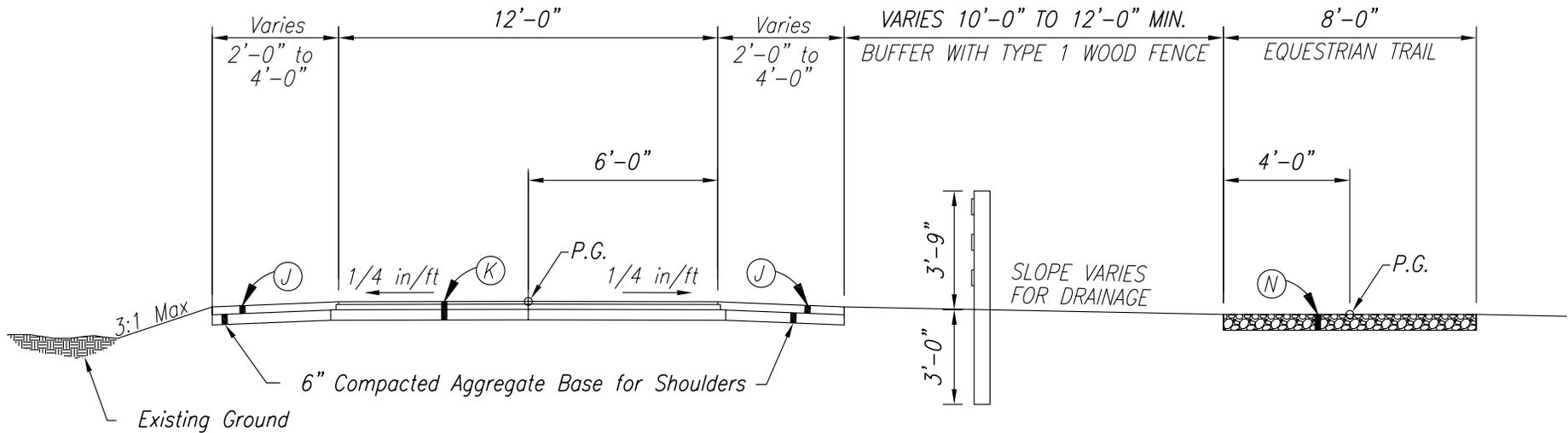
Not Applicable

PART 4 – FIGURES

4.1 STANDARD GENERAL DETAILS

| <u>FIGURE</u> | <u>DESCRIPTION</u> |
|---------------|--|
| PP-1 | Typical Cross Section – Monon and Midland Trace Trails |
| PP-2 | Typical Cross Section – Monon and Midland Trace Trails |
| PP-3 | Monon and Midland Trace Trails |
| PP-4 | Typical Cross Section – Wood Railing Detail |

END OF SECTION 02502



TRAIL TYPICAL WHEN ADJACENT TO EQUESTRIAN TRAIL
SEPERATED BY FENCE
 SCALE = NONE

LEGEND

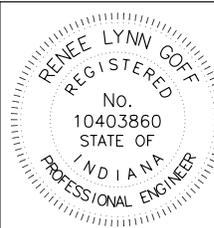
- (K) 110#/SYS HMA, TYPE A, SURFACE, 9.5MM
 220#/SYS HMA, TYPE A, INTERMEDIATE, 19.0MM
 4" COMPACTED AGGREGATE BASE, No. 53
- (J) 3" CRUSHED LIMESTONE FOR SHOULDER
- (N) 8" CRUSHED LIMESTONE FOR EQUESTRIAN PATH

NOTES:

10 FEET OF CLEARANCE REQUIRED ABOVE EQUESTRIAN TRAIL.

FOR TYPE 1 WOOD FENCE DETAILS, SEE FIGURE PP-04

TYPICAL CROSS SECTIONS: MONON AND MIDLAND TRACE TRAILS

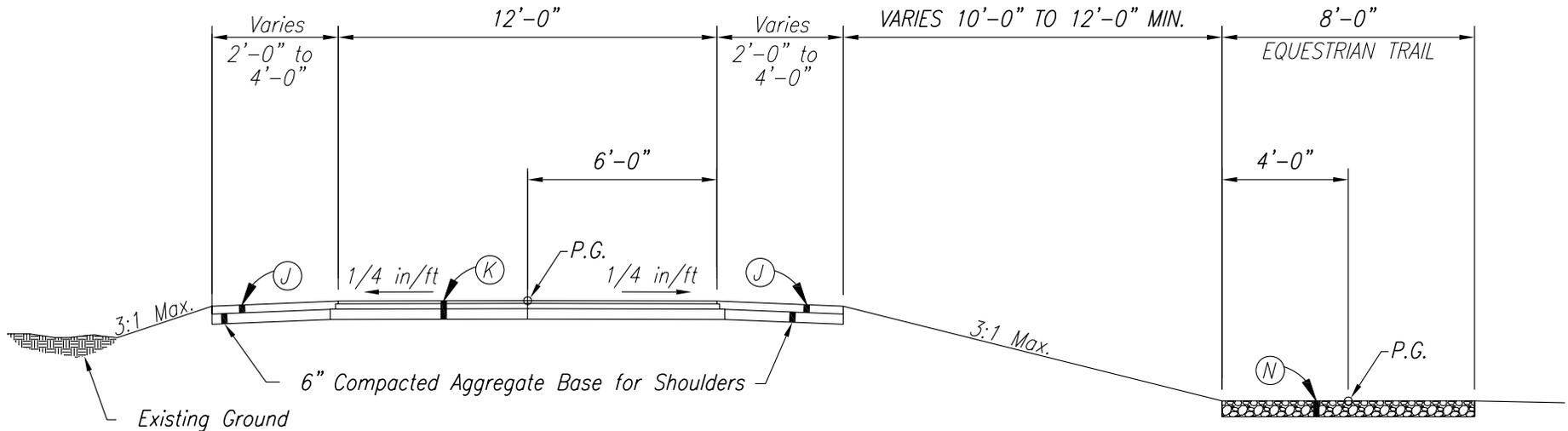


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FIGURE PP-01



TRAIL TYPICAL WHEN ADJACENT TO EQUESTRIAN TRAIL
SCALE = NONE

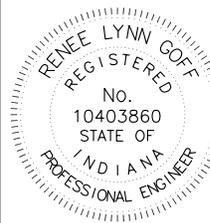
LEGEND

- (K) 110#/SYS HMA, TYPE A, SURFACE, 9.5MM
220#/SYS HMA, TYPE A, INTERMEDIATE, 19.0MM
4" COMPACTED AGGREGATE BASE, No. 53
- (J) 3" CRUSHED LIMESTONE FOR SHOULDER
- (N) 8" CRUSHED LIMESTONE FOR EQUESTRIAN PATH

NOTES:

10 FEET OF CLEARANCE REQUIRED ABOVE EQUESTRIAN TRAIL.

TYPICAL CROSS SECTIONS: MONON AND MIDLAND TRACE TRAILS

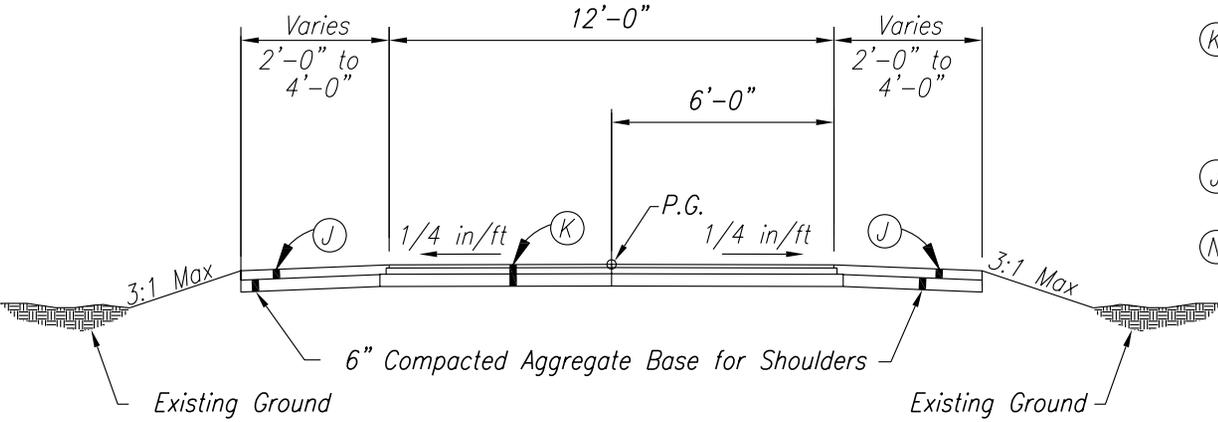


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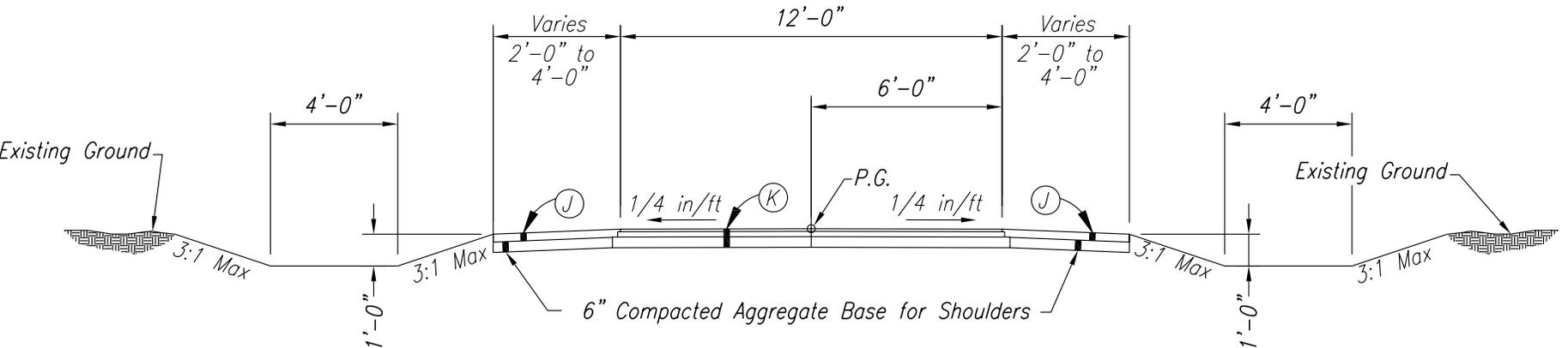
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LEGEND

- (K) 110#/SYS HMA, TYPE A, SURFACE, 9.5MM
220#/SYS HMA, TYPE A, INTERMEDIATE, 19.0MM
4" COMPACTED AGGREGATE BASE, No. 53
- (J) 3" CRUSHED LIMESTONE FOR SHOULDER
- (N) 8" CRUSHED LIMESTONE FOR EQUESTRIAN PATH

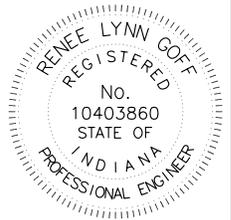


TYPICAL TRAIL FILL SECTION
SCALE = NONE



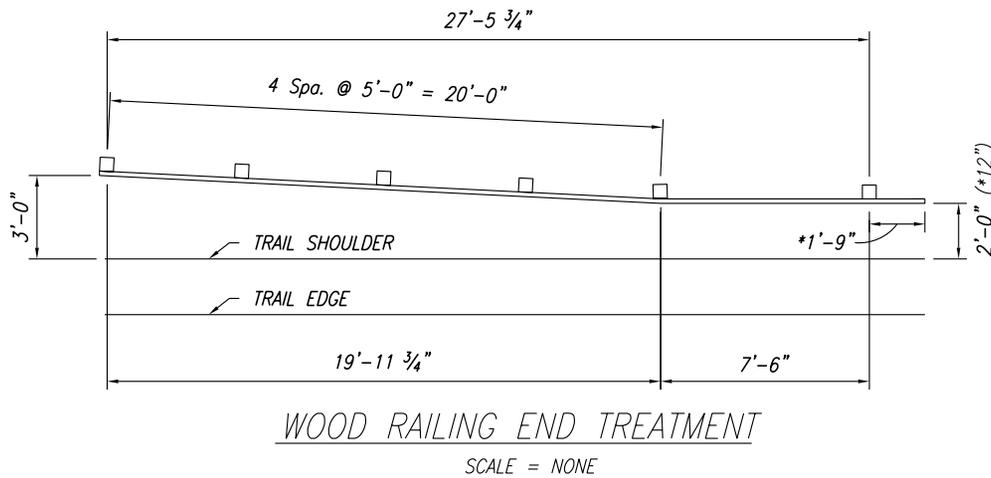
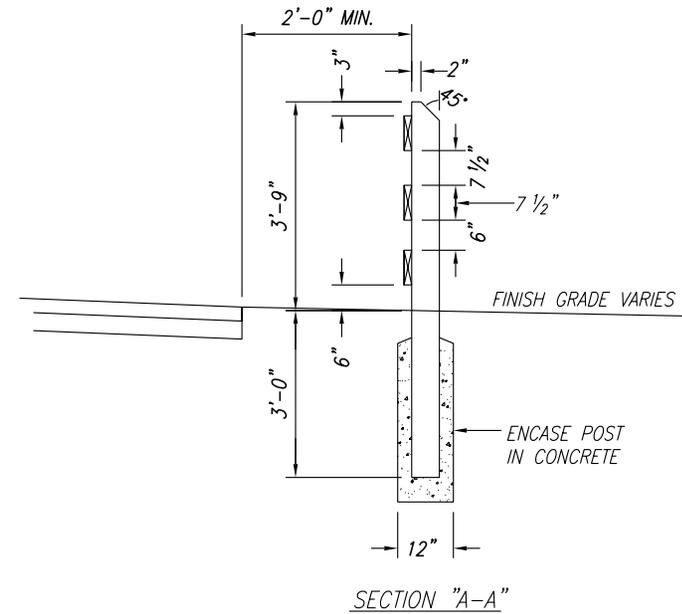
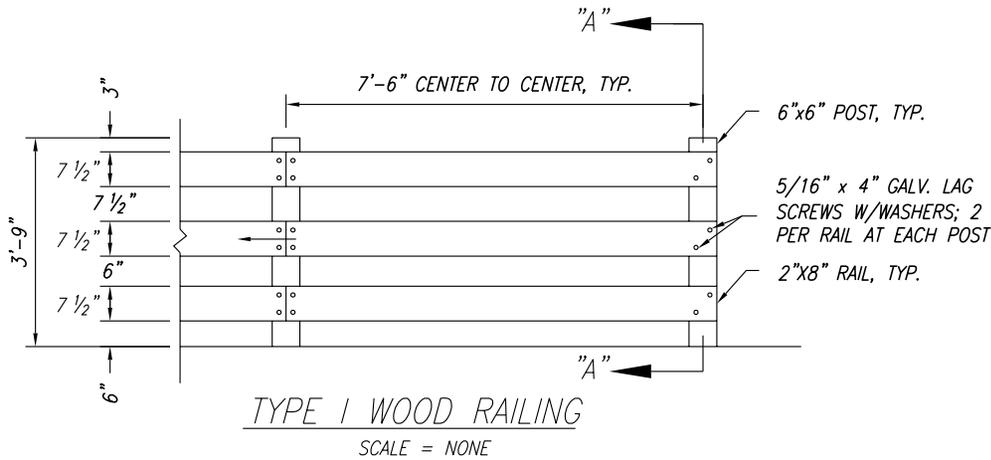
TYPICAL TRAIL CUT SECTION
SCALE = NONE

TYPICAL CROSS SECTIONS: MONON AND MIDLAND TRACE TRAILS

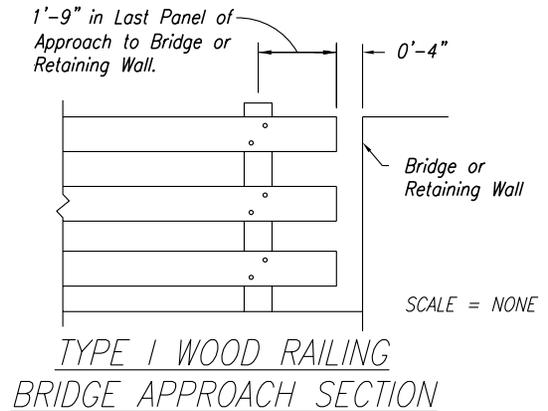


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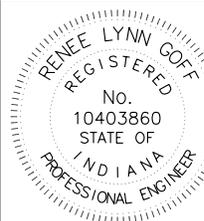
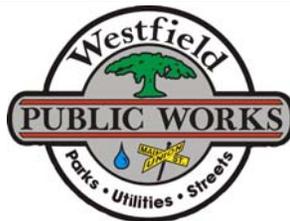
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*NOTE: THESE DIMENSIONS USED FOR END TREATMENT AT BRIDGE APPROACH.



WOOD RAILING DETAILS



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FIGURE PP-4