

Technical Memorandum

To: Janet Tutt, District Manager
Village Community Development Districts

From: Richard V. Busche, P.E., CFM



Date: September 11, 2015
Revised September 15, 2015

RE: **Multi-Use Trail Assessment – The Villages, Florida**
Kimley-Horn Project No: 142202004

Kimley-Horn was retained by the Village Community Development Districts (VCDD) to conduct an assessment of the multi-use trails within The Villages. The purpose of the assessment was to provide recommendations for striping and reflective pavement markings (RPM's) for median treatments and locations with specific geometric constraints as recommended in our June 22, 2015 Villages Multi-Use Trail Edge Line Marking and Median Treatment Evaluation. Below is a summary of our field assessment and recommendations.

Field Assessment

Over the course of three days, Kimley-Horn staff traveled the full length of the multi-use trails, which covers approximately forty-two linear miles. The purpose of the field assessment was two-fold: identify existing locations where RPM's are currently being utilized and identify locations where additional markings are recommended to enhance traveler safety. During the evaluation, locations were identified where the application of striping and RPM's are recommended and can be categorized as one of the following:

- Medians – A landscaped median fully encompassed by a raised concrete curb, which acts as a separator between the two directions of travel on the multi-use trail;
- Geometrically Constrained Locations – Locations of significant horizontal curvature, which reduce the available sight distance for travelers, including tunnel approach ramps and the tunnels themselves;
- Trail-Side Obstructions – Obstructions or obstacles located directly adjacent to the edge of the multi-use trail;
- Roundabouts – Roundabouts within the multi-use trails that contain one or more of the above features.

A GPS-enabled device was used in the field to record both locations of existing enhancements and locations where additional improvements are recommended. All locations which were recorded in the field are depicted on **Exhibits 1-3**. The data points have been coded by shape and color to distinguish between the categories identified above. Roundabouts and other unique and uncommon situations

have been included in the 'OTHER' category. Some of these locations are discussed below with an accompanying detail. The few remaining locations will require additional coordination between VCDD and Kimley-Horn staff.

Recommendations

Kimley-Horn has evaluated the need for additional striping and RPM's based on our field assessment and the standards and guidelines contained in the latest version of the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD). In order to enhance traveler safety along the multi-use trails, Kimley-Horn has compiled the recommendations listed below. Enhancements should be installed consistently throughout the multi-use trail system to provide for orderly and uniform traffic control and messaging.

Medians

Medians located in the center of the multi-use trails should be enhanced with striping and RPM's, in accordance with the attached **Figure 1**. Any existing reflective markers installed on the face of the median curb should be removed at the time of installation. The reflective paint and RPM's used must be consistent with the Florida Department of Transportation's Approved Product List. A variation of this treatment is also recommended at areas in Districts 9 and 10 where channelizing medians exist at some road crossings. At these locations, RPM's only are recommended as outlined on **Figure 4**.

Geometrically Constrained Locations

A geometrically constrained location is an area of sharp curvature where sight distance is reduced for multi-use trail travelers in golf carts. These areas are primarily located where the multi-use trail curves quickly to pass behind entrance gates at main road crossings and at tunnel approach ramps and in the tunnels themselves. These areas are recommended to be marked with RPM's only as outlined on **Figure 2**. As shown in Figure 2, it is recommended that the RPM's be spaced at twenty foot (20 foot) intervals through the geometrically constrained locations. In unique situations where the radius of curvature is unusually small RPM's may be placed at ten foot (10 foot) intervals.

Trail Side Obstruction

The location of existing trail side obstructions were documented. It is important to note that there are numerous locations along the multi-use trail system where landscaping and other improvements exist near the edge of the trail; these are not obstructions. An obstruction is a physical object that directly protrudes into the trail itself. For example, on the section of trail running parallel to C-466, Kimley-Horn documented a location where the multi-use trail warps around the base of an oak tree. At these locations it is recommended to construct a raised curb section and RPM's as outlined in **Figure 3**. Any existing locations of raised curb sections with RPM's were also documented, so that the RPM's can be replaced in accordance with **Figure 3**.

Roundabouts

Kimley-Horn documented two existing roundabouts on the multi-use trails where striping and RPM's are recommended. At these two locations these enhancements should be installed in accordance with **Figure 5** and **Figure 6**.

Summary

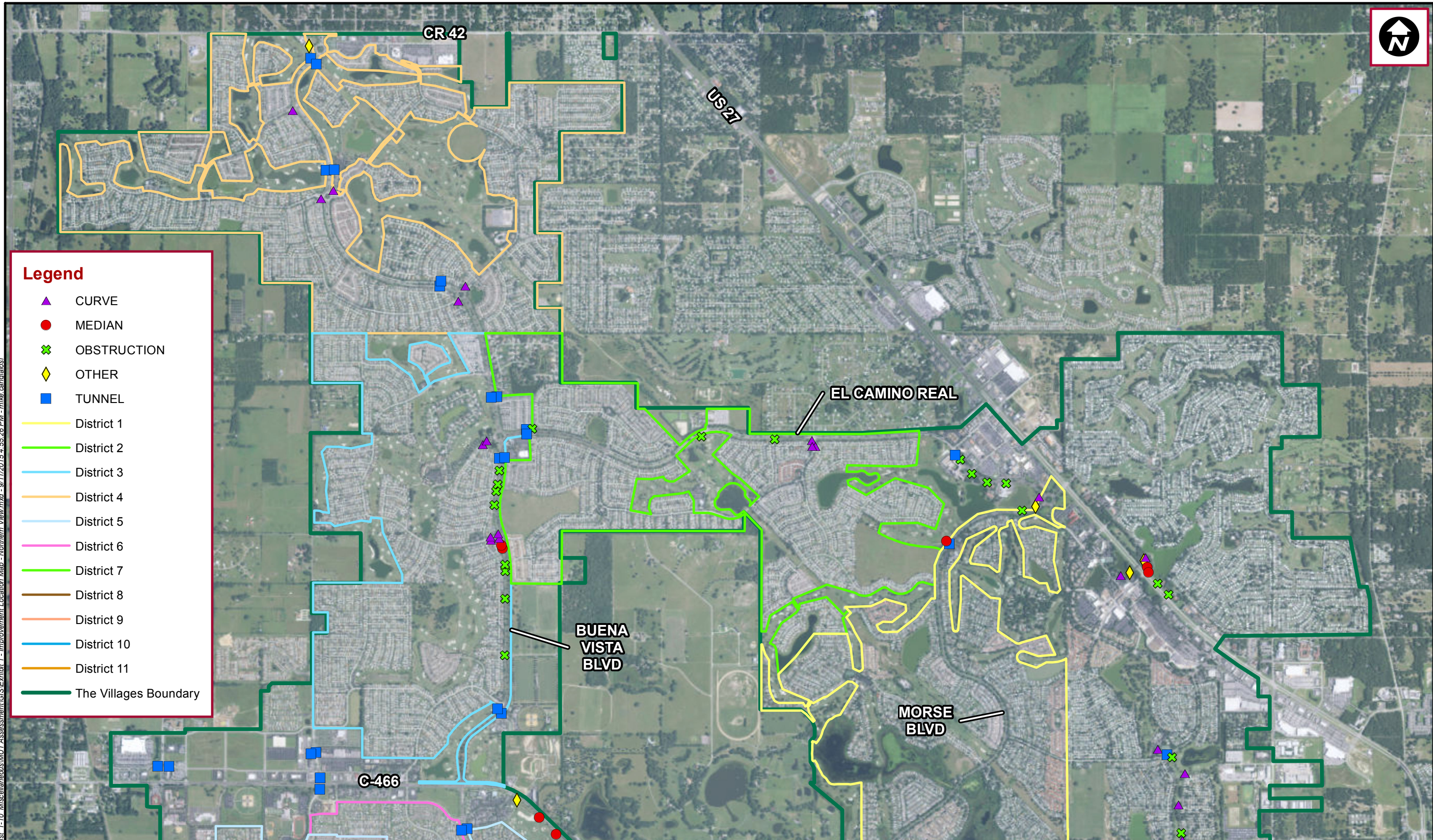
Kimley-Horn has completed a field assessment of the multi-use trail system within the numbered Districts in the Villages. Our findings and recommendations are summarized above. Locations where improvements are recommended are depicted on **Exhibit 1** through **Exhibit 3**. Construction details for the recommended improvements are included in **Figure 1** through **Figure 6**.

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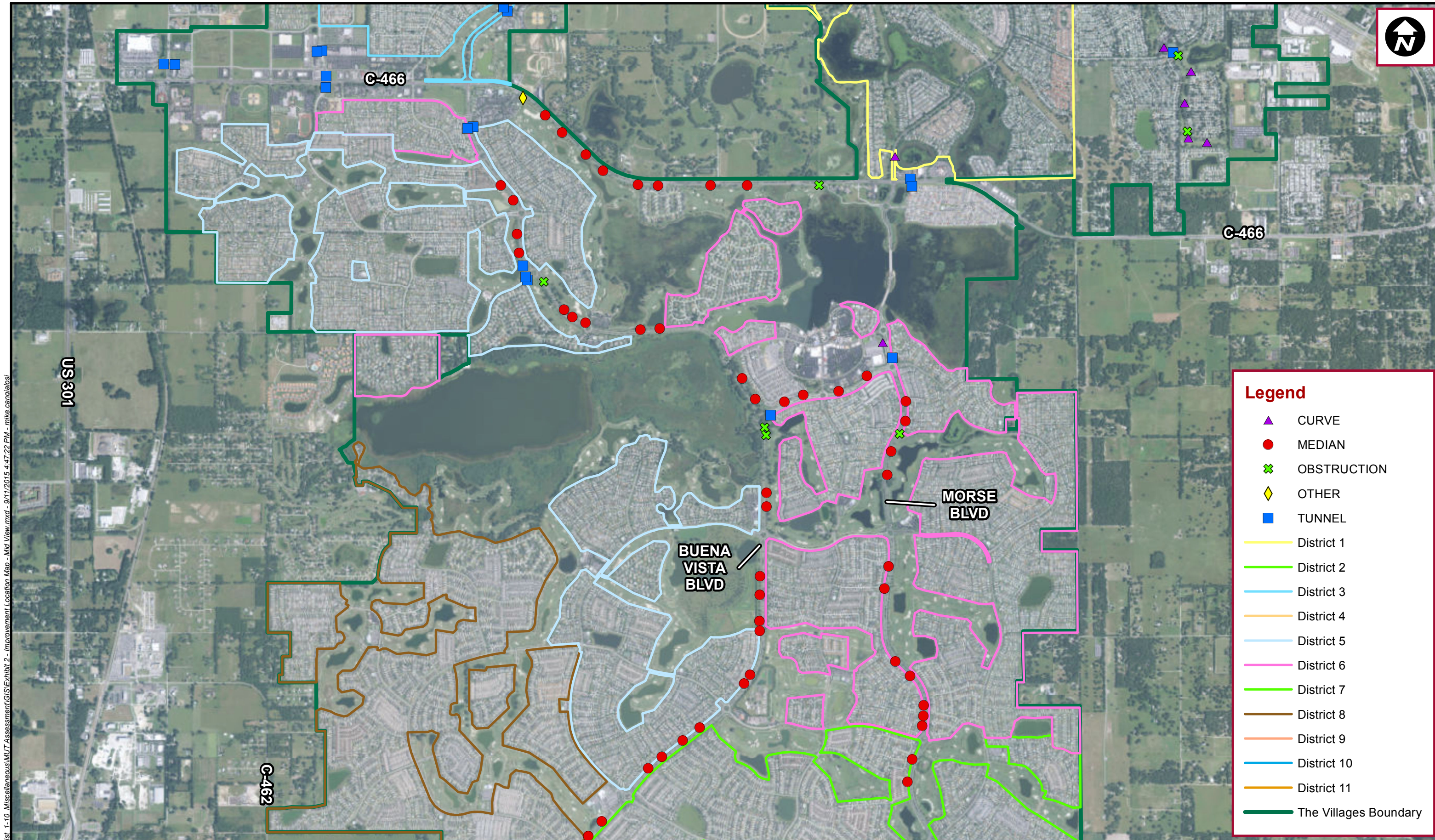


Legend

- ▲ CURVE
- MEDIAN
- ✕ OBSTRUCTION
- ◆ OTHER
- TUNNEL
- District 1
- District 2
- District 3
- District 4
- District 5
- District 6
- District 7
- District 8
- District 9
- District 10
- District 11
- The Villages Boundary



K:\OCA_Civil\142202004\Dist_1-10_Miscellaneous\MUT_Assessment\GIS\Exhibit 1 - Improvement Location Map - Northern View.mxd - 9/11/2015 4:55:26 PM - mike.candiasi



Legend

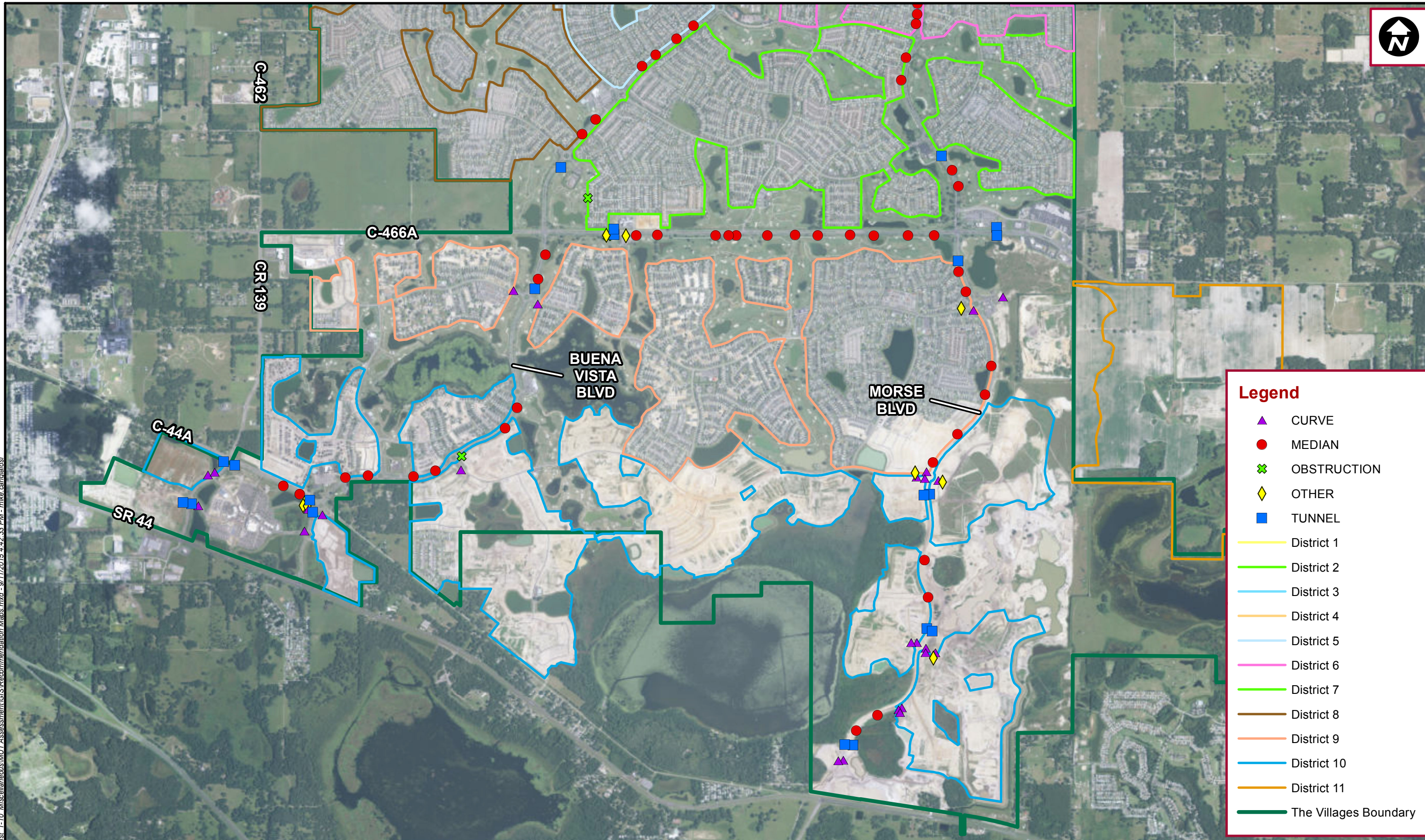
- ▲ CURVE
- MEDIAN
- ✕ OBSTRUCTION
- ◇ OTHER
- TUNNEL
- District 1
- District 2
- District 3
- District 4
- District 5
- District 6
- District 7
- District 8
- District 9
- District 10
- District 11
- The Villages Boundary

K:\OCA_Civil\142202004\Dist_1-10_Miscellaneous\MUT_Assessment\GIS\Exhibit 2 - Improvement Location Map - Mid View.mxd - 9/11/2015 4:47:22 PM - mike.carpalosi

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IMPROVEMENT LOCATION MAP - MID VIEW
 MULTI USE TRAIL MARKING EVALUATION
 THE VILLAGES, FLORIDA

Project No. 142202004
September 2015
Not to Scale
Exhibit 2



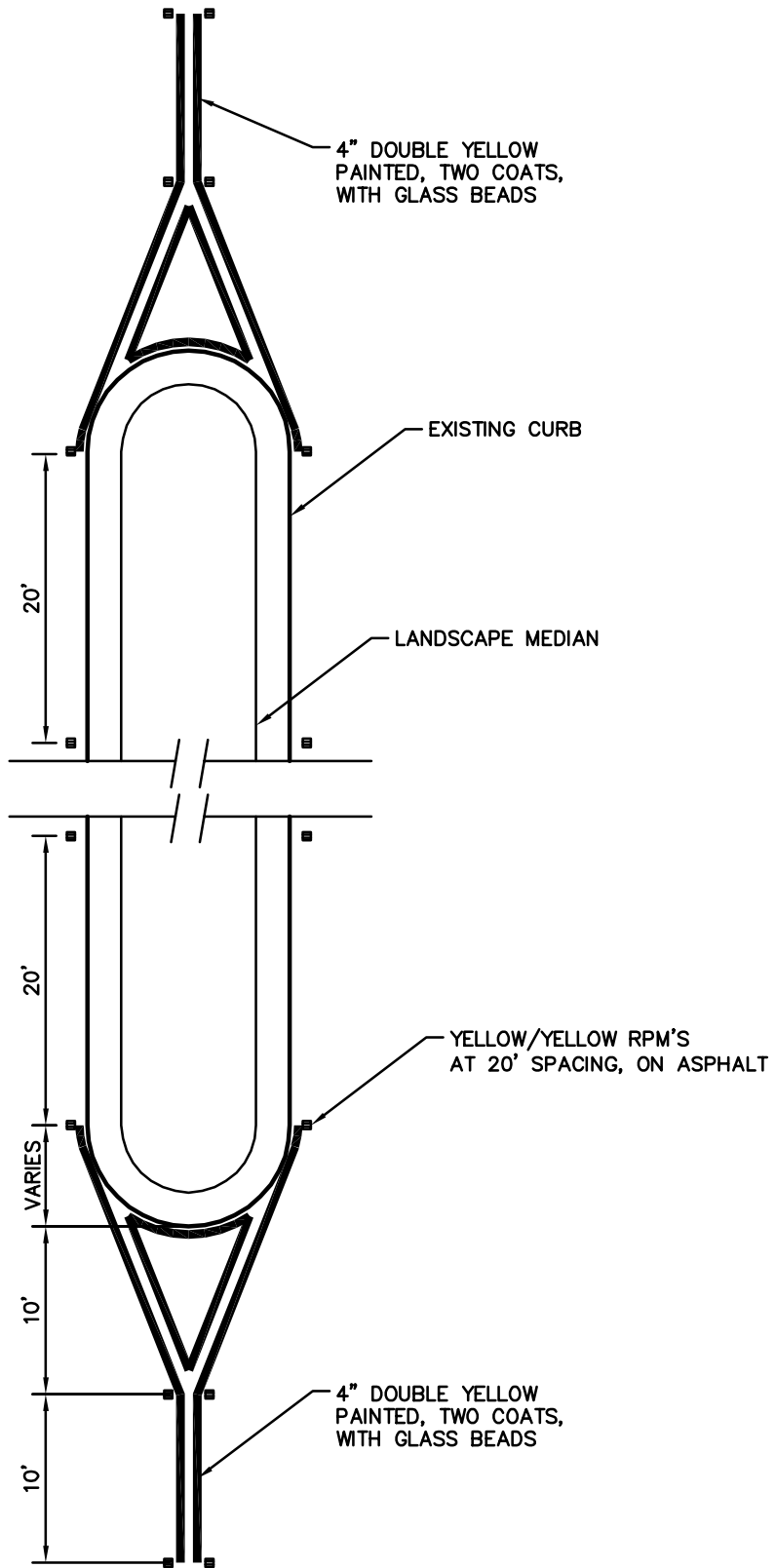
Legend

- ▲ CURVE
- MEDIAN
- ✕ OBSTRUCTION
- ◆ OTHER
- TUNNEL
- District 1
- District 2
- District 3
- District 4
- District 5
- District 6
- District 7
- District 8
- District 9
- District 10
- District 11
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FIGURE 1
MEDIAN TREATMENT

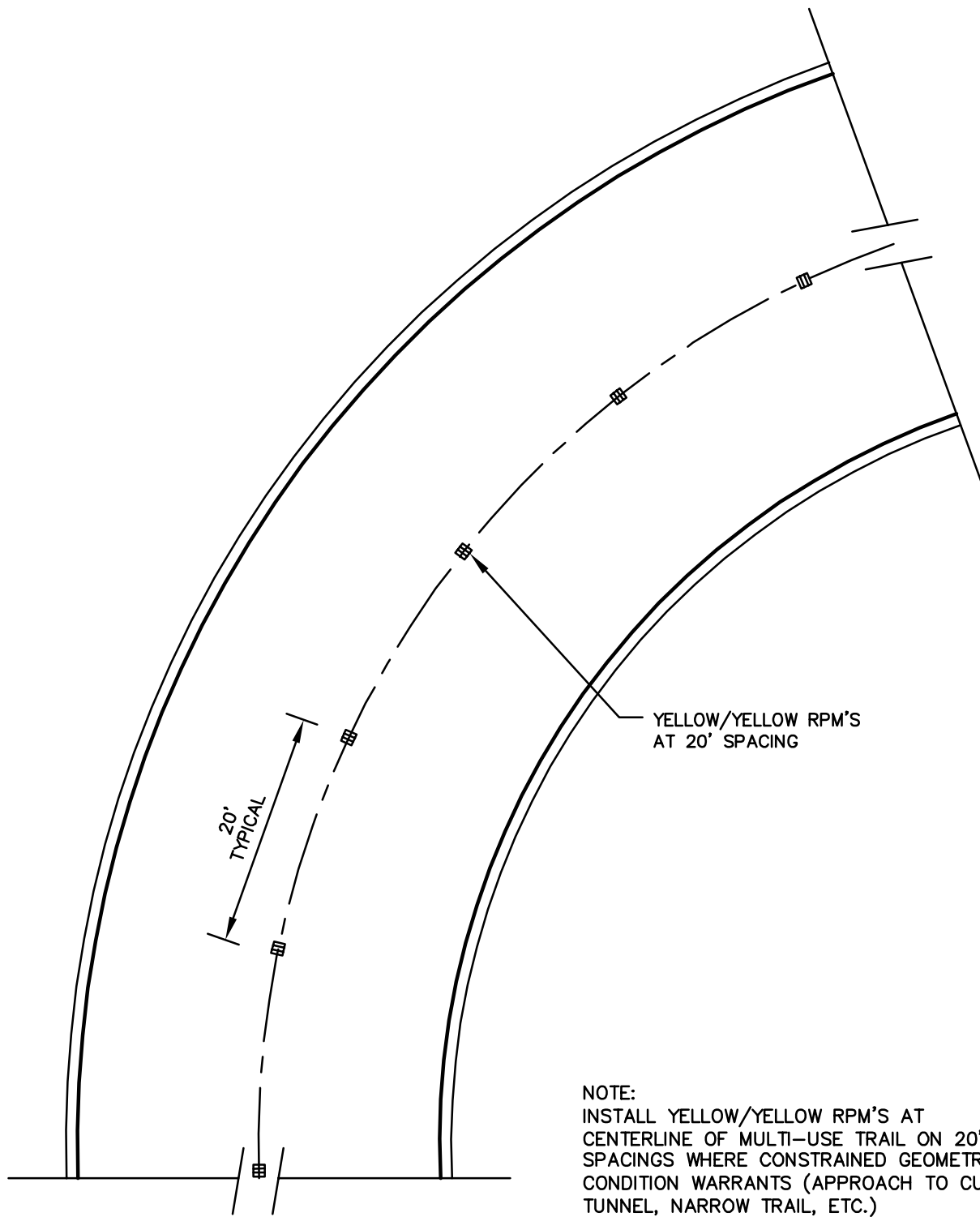


NOTE:
PAINTED PAVEMENT MARKINGS SHALL BE INSTALLED USING PRODUCTS APPEARING ON THE FDOT APPROVED PRODUCTS LIST (APL), MEETING THE REQUIREMENTS OF THE 2015 FDOT STANDARD SPECIFICATIONS SECTIONS 710 AND 971.

DATE SEPTEMBER 2015 PROJECT NO. 142202004 SHEET NUMBER 01	<h2>MULTI USE TRAIL MARKING EVALUATION</h2>	SCALE N.T.S. DESIGNED BY KHA DRAWN BY DSC CHECKED BY RVB DESIGN ENGINEER: RICHARD V. BUSCHE, P.E. FLORIDA P.E. LICENSE NUMBER: 58568 DATE:	<h2 style="text-align: center;">Kimley»Horn</h2> <p style="font-size: small; text-align: center;"> © 2015 KIMLEY-HORN AND ASSOCIATES, INC. 1823 SE FORT KING STREET, SUITE 200, OCALA, FL 34471 PHONE: 352-438-3000 WWW.KIMLEY-HORN.COM CA 00000696 </p>
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FIGURE 2 GEOMETRICALLY CONSTRAINED LOCATIONS

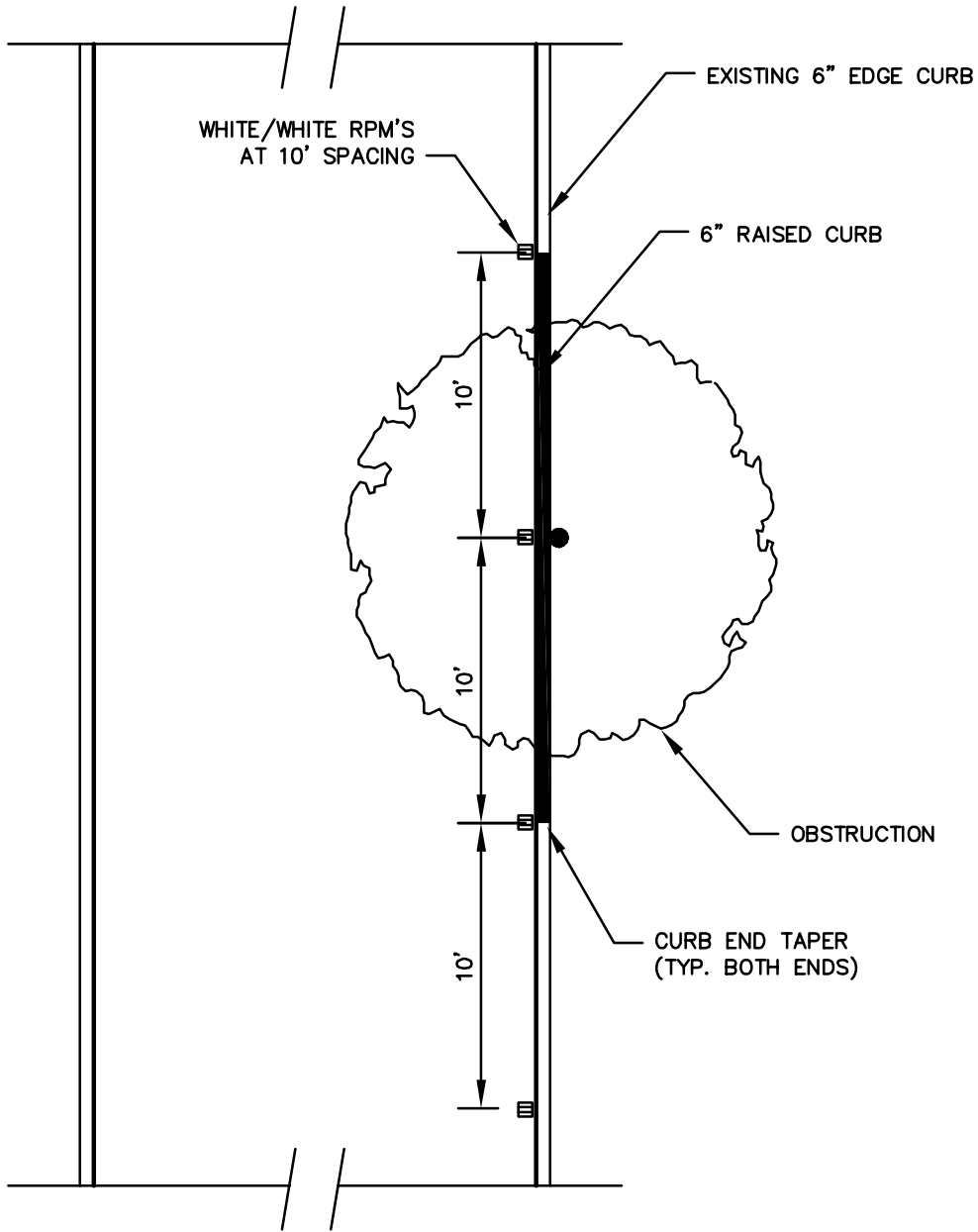


NOTE:
INSTALL YELLOW/YELLOW RPM'S AT CENTERLINE OF MULTI-USE TRAIL ON 20' SPACINGS WHERE CONSTRAINED GEOMETRIC CONDITION WARRANTS (APPROACH TO CURVE, TUNNEL, NARROW TRAIL, ETC.)

DATE SEPTEMBER 2015	<h3>MULTI USE TRAIL MARKING EVALUATION</h3>	SCALE N.T.S.	DESIGN ENGINEER: RICHARD V. BUSCHE, P.E.	<p style="font-size: 8px;">© 2015 KIMLEY-HORN AND ASSOCIATES, INC. 1823 SE FORT KING STREET, SUITE 200, OCALA, FL 34471 PHONE: 352-438-3000 WWW.KIMLEY-HORN.COM CA 00000696</p>
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		DATE:		

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FIGURE 3 TRAIL SIDE OBSTRUCTION



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MULTI USE TRAIL MARKING EVALUATION

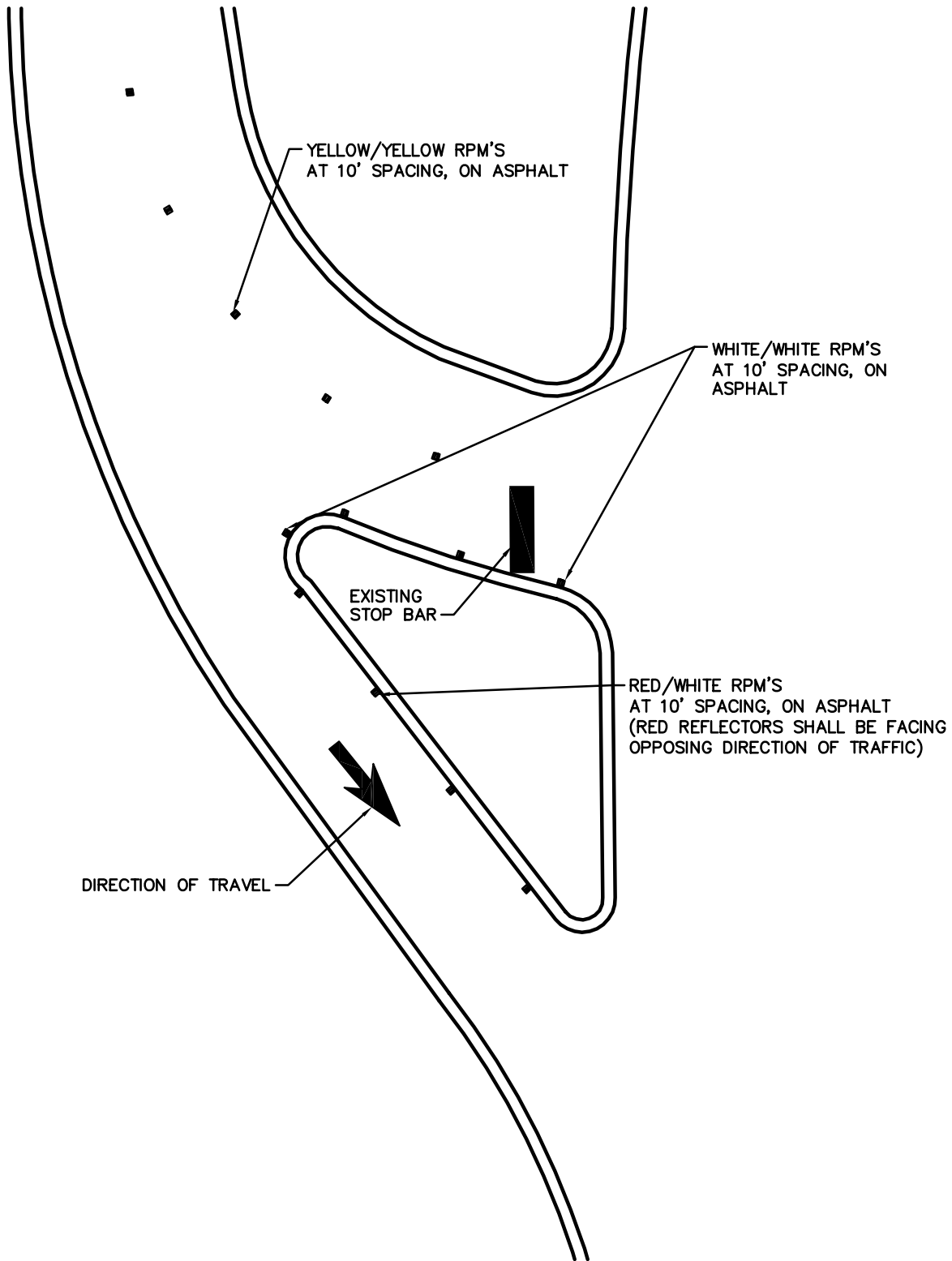
SCALE	N.T.S.	DESIGN ENGINEER:	RICHARD V. BUSCHE, P.E.
DESIGNED BY	KHA	FLORIDA P.E. LICENSE NUMBER:	58568
DRAWN BY	DSC	DATE:	
CHECKED BY	RVB		

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FIGURE 4 CHANNELIZING MEDIAN



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MULTI USE TRAIL MARKING EVALUATION

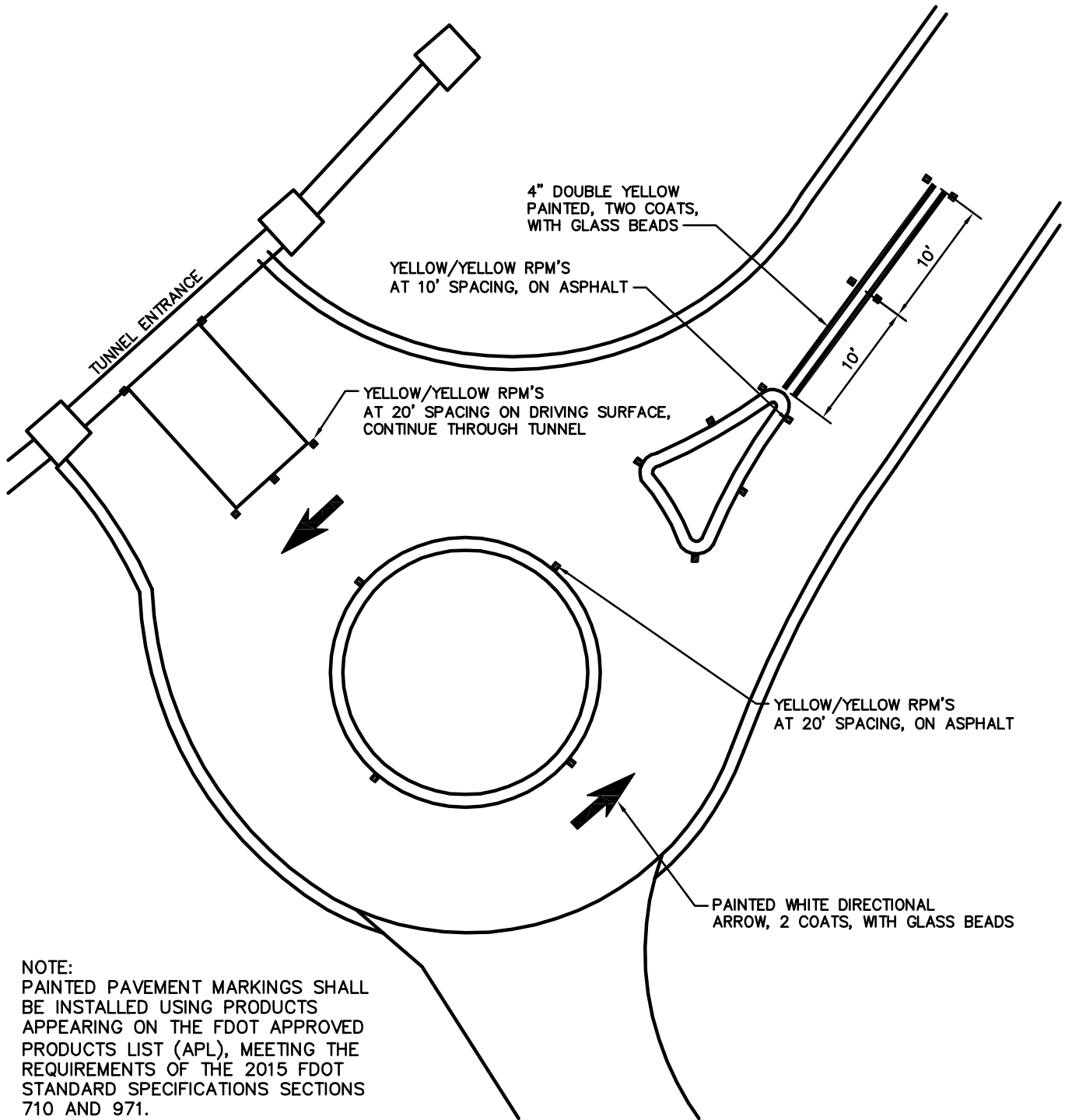
SCALE	N.T.S.	DESIGN ENGINEER:	RICHARD V. BUSCHE, P.E.
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FIGURE 5 DISTRICT 4 MULTI USE TRAIL ROUNDABOUT

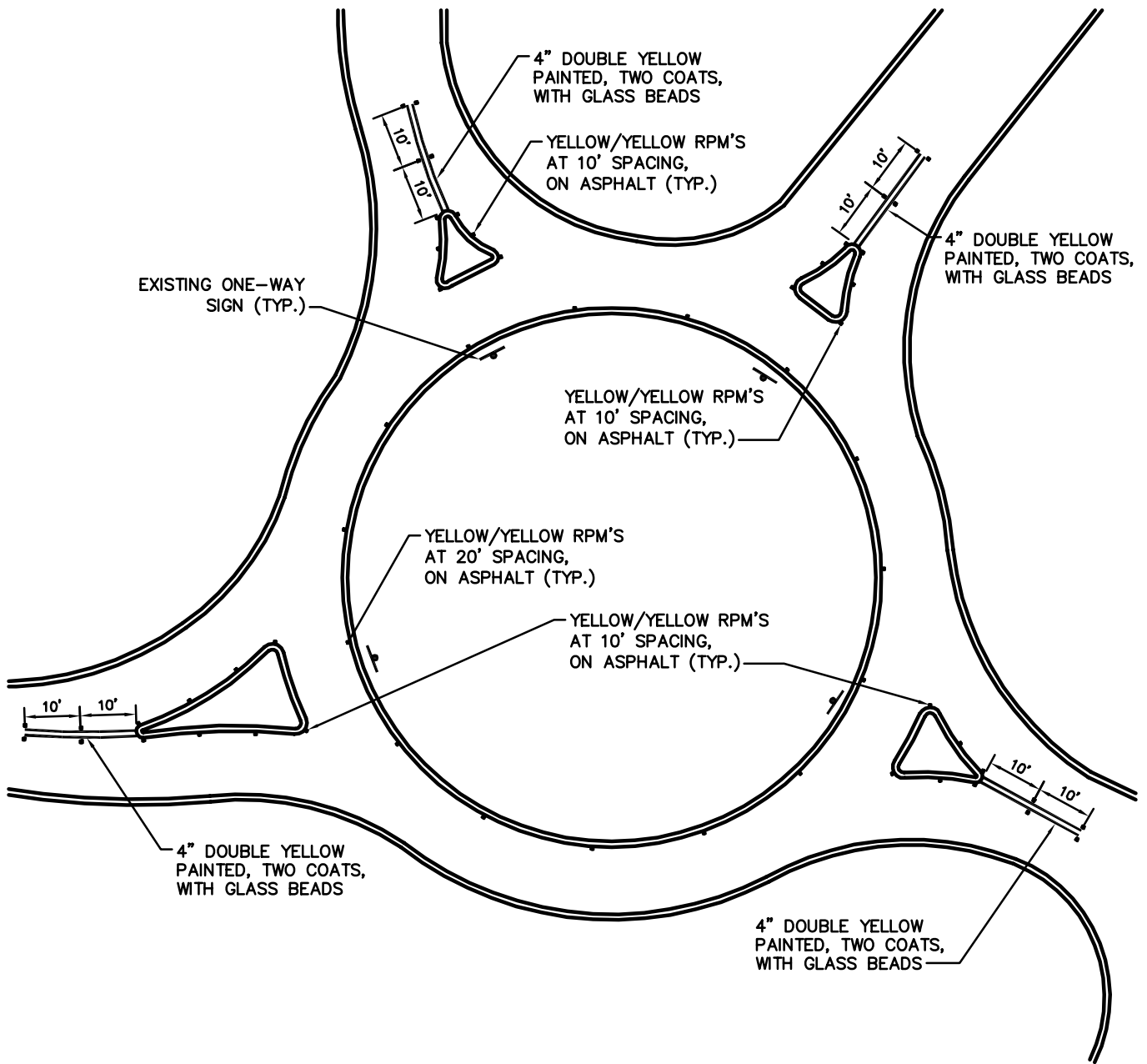


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FIGURE 6 BROWNWOOD MULTI USE TRAIL ROUNDABOUT



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