



PRELIMINARY ENGINEERING REPORT

LOCAL ROAD IMPROVEMENTS

TOWN OF DAYTON

DAYTON TOWN HALL

SHADY LANE AND WESLEYAN DRIVE

0.19 MILE SOUTH OF WALNUT STREET (STATE ROAD 38)

TIPPECANOE COUNTY



VS ENGINEERING, INC.

4275 North High School Road
vsei@vsengineering.com
Phone: (317) 293-3542

Indianapolis, Indiana 46254
www.vsengineering.com
Fax: (317) 293-4737

PURPOSE OF REPORT

At the Dayton Town Council meeting on April 2, 2018, Dayton Street Commissioner and Town Council Member, Ashley Stephenson presented new business concerning Shady Lane's access into the subdivision and where the road ends. As the road enters, there are sharp curves, poor visibility and a narrow road making for unsafe conditions. Where the road dead ends, there is neither connectivity nor public turn around capabilities. VS Engineering, Inc. was approved to evaluate the study areas, provide alternatives to consider and present our findings in a Preliminary Engineer's Report.

This report documents the engineering assessment phase involving potential road improvements on Shady Lane and Wesleyan Drive (Appendix A-1). This report contains relevant background data; identifies the purpose and need; provides alternative concepts with cost estimates for each; and provides conclusions and recommendations.

PROJECT LOCATION

In the Town of Dayton, the project study areas are located on Shady Lane, approximately 0.19 mile south of the intersection of State Route 38 and Dayton Road in Section 9 of T-22-N, R-3-W, Sheffield Township in Tippecanoe County. Two parts of Shady Lane are being evaluated (Figure 1). Study Area 1 covers the area where Shady Lane intersects Dayton Road through the double 90-degree turns to the east. Study Area 2 covers the south end of Shady Lane, where the road dead ends and extends south to Wesleyan Drive, a dead end road to the south. Refer to Appendix's A-1 and A-4 through A-15 for vicinity map and ground level pictures.



Figure 1: Project Location Map

PROJECT PURPOSE AND NEED

The primary purpose of this project is to improve the safety, operational deficiencies and connectivity of Shady Lane. A secondary purpose is to improve water supply circulation and water quality of the service area.

The need in Study Area 1 is due to the road leading into the subdivision narrowing into a sharp 90-degree reverse curve section with close mature trees lining both sides. One's view in both directions is obscured by trees. The narrow road through the curves does not allow two vehicles to pass each other safely. The road width at the curves does not allow vehicles with larger turning paths to stay on pavement through the turns. Snow removal operations are quite difficult without minimum road curvature and momentum to push snow through (A-4 through A-9).

For Study Area 2, the need is due to Shady Lane and Wesleyan Drive only having a single access to serve their subdivision (Figure 1). Should access close for any unforeseen circumstance, residents would be closed-in and emergency responders closed-out. Additionally, without a means to pass through or turn around, school buses won't drive down the road and trash collection vehicles or others commercial deliveries turn around in private drives or back down roads.

The secondary need for the project is to eliminate two dead end water line extensions with new pipe connections (A-16).

ROAD HISTORY

Shady Lane was part of the original 1829 Dayton Town Plat. Over time, Shady Lane became an improved road in phases. First, the middle road section, between the end of the north curve and Railroad Street was platted as the Daytona Estates Subdivision in 1965. The next phase of Shady Lane came from the 1979 plat of Millikan Subdivision, which extended Shady Lane east and then south approximately 170-feet to its end. In 1988, the southern part of Shady Lane was included in an access easement to the property for the road which is where the road currently is located. In 1990, Millikan was re-platted as Johnson Estates. In 2004, the beginning part of Shady Lane connecting to Dayton Road was re-platted in the Dayton Pines Minor Subdivision and became a public road.

Similarly, Wesleyan Drive was also part of the original town plat. Where Wesleyan Drive terminates at the south end of Study Area 2 project location became a public road in full after acceptance and recording of the Wesley Subdivision in 1993.

EXISTING CONDITIONS

Roads

Shady Lane is a 2-lane rural asphalt road functionally classified as a local rural estates residential subdivision road. The 0.30 mile road primarily runs west to east with two short north-south segments. Road width varies from 17-feet to 23-feet with earth shoulders and no curbs. The road terminates into a paved access easement serving two other properties. Pavement is in fair condition with moderate longitudinal, lateral and edge cracking throughout. Preventive maintenance treatments such as crack sealing have been previously applied. Within the study areas the pavement condition is somewhat worse with potholes, raveling and some spots with structural failure (A-6).

Wesleyan Drive is also a 2-lane rural asphalt road functionally classified as a local rural estates residential subdivision. The 0.18 mile road consists of 23-foot wide asphalt pavement with usable earth shoulders. The road terminates as a dead end with no means to turn around other than using a private drive (A-13).

Study Area 1 –The existing road is lined with mature trees and a 2-rail wood fence on both sides from the entrance through the study area. A vacant parcel to the north is currently a level well-maintained open grassy field. The road has a 20-foot pavement section until it approaches a sharp 90-degree, 40-foot radius curve left. The pavement width narrows to as little as 17-feet and remains narrow through a second curve. A short 130-foot tangent section leads into another sharp 90-degree, 50-foot radius curve to the right. Mature trees through this tangent section are lined between the rail fence and road. Most of them are within 8-feet of the roads edge with the closest at 2.5-feet. The road widens to 20-feet after the curve. The grade of the road through this section is fairly level falling less than 0.5% from east to west towards Dayton Road (A-4 and A-5).

Study Area 2 – Shady Lane, as it turns south for about the last 170-feet, is 20-feet wide after the turn and narrows to 18-feet at the end. The dead end road is connected to a paved access easement serving two properties. There are no provisions to turn around unless the private access easement or drives are used. The road falls from south to north at about a 1% grade. Mature pine trees line the paved easement on the west side. Another line of mature trees run along the east side. A 2-rail wood fence transverses through the property on an arc. Numerous young trees have been planted along the west side of the fence. No buildings exist. The Bush Cemetery is located on the east side of the study area adjacent to the proposed corridor (A-10 through A-15).

Wesleyan Drive terminates at a dead end but, concrete pavement continues as a drive entrance for two properties. Only private drives are available for vehicles to turn around. The north side of the road and extended pavement are lined with several trees along the property line (A-14).

Stopping Sight Distance (SSD)

Stopping sight distance conformance is based on maintaining a clear line of sight for a minimum distance for a given speed along with other factors. This means for horizontal curves, the inside of the curve must be clear of obstructions to the middle ordinate to meet the require SSD (A-2). Evaluation of the study areas found:

Study Area 1 –The intersection sight distance at Dayton Road is open, clear and unobstructed for the minimum criteria of 200-feet for 30 MPH. Looking north, the existing railroad crossing can be seen from the intersection, a distance of over 550-feet. A minimum site distance of 200-feet is required for Shady Lane (Table 1). A clear sight line for the minimum distance becomes obscured shortly after turning onto the roadway. The same is true in reverse direction approaching the first curve (A-7 and A-8). As seen in A-8, the trees inside the curves and lining the north-south segment block the sight lines. Existing sight distance becomes less than 50-feet as one enters a curve.

Study Area 2 – The existing 170-foot north-south Shady Lane segment is a straight fairly flat roadway with clear sight lines the entire length (A-13). Wesleyan Drive is a straight fairly flat roadway as well with sight lines clear.

Drainage

Hydrology and Hydraulic analysis was not included in the scope of work for the study. The resource for information provided is the Tippecanoe County GIS Topography layer found in Appendix A-3.

Study Area 1 – Terrain is flat falling under 1% from east to west. Storm water conveyance is uncontrolled with no apparent road side ditches or other drainage features. Storm water runs down and eventually off the road continuing to sheet flow towards the side ditch for Dayton Road. None of the alternatives evaluated would change the existing overall drainage pattern.

Study Area 2 – The high point of the area is a knoll located at the end of the pavement. Terrain falls in all directions from this area. Shady Lane roadway drainage sheet flows south to north-northeast having no apparent drainage features (A-10).

Utilities

Utilities found serving the Town of Dayton covering the two project study areas include:

- Water & Sewer – Dayton Municipal Utilities
- Electric – Duke Energy
- Communication – Frontier Communication
- Telephone – Mulberry Cooperative Telephone Company
- Gas – Vectren

Utility maps for Dayton Municipal Utilities, Duke Energy and Frontier Communication showing the approximate location of their facilities are found in Appendix A-16 through A-20. No information from the telephone or gas providers has been made available.

Study Area 1 – Water and sanitary sewer facilities exist within the existing roadway corridor. Water lines are shown outside the north and west pavement edge. Sanitary sewer runs under the north-south road segment. Along Dayton Road, the sewer runs outside the pavement on the east side.

Electric facilities exist within Study Area 1. Along Dayton Road, the lines run overhead on the east side.

Frontier communication facilities exist on the north side of Shady Lane going east beginning at the east edge of Study Area 1.

Study Area 2 – Water and sanitary sewer exists on the west side of the north-south road segment and terminate at the road's end. Water pipes shows outside the pavement while the sewer shows under.

Electric facilities exist with Study Area 2. Overhead lines run down the east side of Shady Lane to its end. An underground line extends from a ground mounted transformer northeasterly to the west side at the end of Shady Lane. Along Wesleyan Drive, electric is mounted on poles along the north side.

Frontier communication facilities exist along the east side of Shady Lane just a short distance past where the road turns south.

Preliminary Red Flag

A preliminary red flag investigation found minimal concerns. No hazardous material sites were found that could impact the project. Mapped wetland areas are well outside study areas. There is one potentially-historic resource in the middle portion of Shady Lane (A-21). A “notable” Italianate-style house is located on the south side across from Railroad Street. “Notable” is the middle of *three* possible ratings and means the structure may or may not be eligible for the National Register of Historic Places. This house is outside both project study areas and likely outside any “Area of Potential Effect”. Project areas are outside FEMA mapped floodplains (A-22). Bush Cemetery is located in Study Area 2 south and east at the end of Shady Lane (A-11, Picture 16).

Right-of-Way (RW)

RW research in the context of this study shows for Study Area 1, the existing roadway falls within a 50-ft. public RW. One (1) parcel is impacted by both alternatives considered, a 4.06 acre grassy field with trees around the perimeter along the north and west sides of Shady Lane. For Study Area 2, public RW of 40-feet exists to the south end of the road. Two (2) parcels fall within the study area are impacted by both alternatives considered.

DESIGN CRITERIA AND REVIEW

Safety design criteria items are the same between the Tippecanoe County's Unified Subdivision Ordinance (USO) and the Tippecanoe County Highway Departments (TCHD) Standards. TCHD standards are shown in Table 1.

Table 1 below shows minimum design criteria for a new rural estates local residential subdivision road per the TCHD Standards and INDOT Geometric Design Criteria for Rural Local Roads (New construction or Reconstruction). The values from the rural estate subdivision local road typical road section from TCHD are shown. For improving existing roads, INDOT 3R Geometric Design Criteria for Rural Local Roads is shown.

Design Standards	Minimum Width of Right-of-Way(ft)	Minimum Pavement Width(ft)	Minimum Side Ditch Width(ft)	Minimum Shoulder Width(ft)	Maximum Grade	Minimum Radius of Curve(ft)	Minimum Length of Tangent(ft)	Minimum Sight Distance(ft)	Minimum Turn-around(ft)
New Construction									
TCHD Rural Estates Local Subdivision Road Specifications	52	20	12	4 (earth)	7.5%	100	100	200	76
INDOT New Local Road	As Needed	20	As Needed	2 (useable)	7%	250	100	200	-
Widening and Rehabilitation									
TCHD Rural Estates Local Subdivision Road Specifications	52	20	12	4 (earth)	7.5%	100	100	200	76
INDOT Local Road 3R	Existing	18	-	2 (useable)	10%	200	100	200	-
Shady Lane - SA1									
Existing	50	17	-	2 (earth)	0.4-0.5%	40	130	< 50	-
Shady Lane - SA2									
Existing	40	18	-	2 (earth)	1.0%	N/A	170	>170*	-

Regulated Speed: 30 MPH

*Full length of existing road

Table 1 Design Criteria Comparison

A minimum obstruction free zone of 6-feet plus a 2-foot minimum shoulder is required when widening or rehabilitating an existing road of this classification.

Study Area 1 – Comparing design criteria with existing conditions found the values highlighted in yellow in Table 1 not meeting minimum criteria in either of the design standard documents. These include pavement width, curve radius and sight distance.

Study Area 2 – Evaluation of the north-south segment of Shady Lane was used to determine existing design criteria conformance. All design criteria other than the minimum RW is met.

ALTERNATIVE ANALYSIS

Table 1 minimum design criteria are used in evaluation of improvement alternatives. Improvements confined to existing pavement edges would follow local maintenance practices. Per the scope of work, alternatives considered for Study Area 1 include no geometric improvements, next maintenance treatment; widening the existing road to current standards; and realign the road with a new access to Dayton Road. For Study Area 2, alternatives include adding a cul-de-sac at each existing road terminus; and extending Shady Lane to Wesleyan Road with a new road connection.

Included in this report is an additional scope of work item to provide a cost estimate for a new water line connection between the existing facilities on Shady Lane and Wesleyan Drive. Alternative 3.0 further details this option.

1. SHADY LANE TO DAYTON ROAD CONNECTION – STUDY AREA 1

ALTERNATE 1.1: No Geometric Improvements, Next Maintenance Treatment

This alternate provides preventive maintenance to the 250-foot north-south segment of existing pavement to restore the pavement. This includes full depth patching areas of structural failure along with milling and replacing 1.5-inches of asphalt surface the full road width of the entire segment.

ALTERNATE 1.2: Widen Existing Road to Meet Minimum Standards (A-23)

To meet minimum standards and maintain the existing intersection with Dayton Road is an approximately 365-foot new section of road from the north curve southwesterly to Shady Lane fitting both ends with a minimum 100-foot radius. This alternative stays within the applicable criteria for a 3R local road rehabilitation project. The rural estates standards call for a 20-foot wide pavement section with 4-foot earth shoulders, a 12-foot width for ditches in 52-feet of RW. An 8-foot obstruction free zone would be clear of trees or other obstacles. Sight distance requirements will be met inside the two horizontal curves.

The pavement structural section includes 1.5-inches asphalt surface over 4.5-inches asphalt base over 12-inches for compacted aggregate base. Pavement sections no longer in use are removed. Disturbed areas are graded and grass planted.

RW acquisition from one (1) parcel is identified. A 52-foot RW width per standards for the realigned portion of Shady Lane is proposed for a total of 0.28 acres.

Dayton Municipal Utilities are the only known utility within proposed improvements. Impacts should be limited to pipe encasements and casting adjustments.

ALTERNATE 1.3: Relocate Intersection and Road Approach – Eliminate Curves (A-24)

This alternative eliminates the existing road from the intersection with Dayton Road through the second curve. A new access with Dayton Road aligns across from Liberty Farms Minor Subdivision. The approximately 450-foot long new road extends east to intersect Shady Lane at the northern curve for a continuous east-west alignment.

TCHD rural estate subdivision local road criteria shown in Table 1 are applicable. The values are used in exhibits and for cost estimating purposes. The new pavement section consists of 20-foot wide asphalt pavement with 4-foot wide earth shoulders; a 12-foot minimum side ditch width; a 10-foot obstruction free zone provided; and a minimum RW width of 52-feet. The pavement structural section is the same as detailed in Alternative 1.2. Pavement sections no longer in use are removed. Disturbed areas are graded, grass planted and fertilized.

RW acquisition from one (1) parcel is identified. A 52-foot RW width following standards up to Dayton Road RW is proposed for a total of 0.39-acres.

A Duke Energy utility pole is located in the vicinity of the southeast corner of the proposed new approach to Dayton Road. Design adjustments should find a way to avoid utility pole relocation. Additional utility coordination is necessary to understand the specific details of each utility located in realignment considerations. Preliminary conclusions indicate impacts to existing utilities can be avoided without added cost to the alternative.

2. SHADY LANE TO WESLEYAN DRIVE CONNECTION – STUDY AREA 2

ALTERNATE 2.1: Cul-de-sac Dead End Roads (A-25)

This alternative adds offset 38-foot radius cul-de-sacs, large enough for school buses to turn around, at each end of Shady Lane and Wesleyan Road. The pavement thickness and shoulder section for both is the same as described in Alternative 1.2.

For Shady Lane, improvements include connecting two drive approaches to the new cul-de-sac. No utility impacts are anticipated.

At Wesleyan Road, other features are the same as the Shady Lane cul-de-sac with two (2) existing drive approaches to connect.

Dayton Municipal Utilities water line will require adjustments. Extension to the outer edge of the new cul-de-sac and relocating a fire hydrant is anticipated and new service connection provided to two (2) parcels. If pipe cover requirements can't be met, the water line is relocated to outside the cul-de-sac

pavement. Service reconnections to as many as three (3) parcels are possible for electric service. Relocation of all other service connections is anticipated for two (2) parcels. The lone exception is sanitary sewer.

RW acquisition is necessary from one (1) parcel. The initial layout uses a 52-foot RW width, around each cul-de-sac 0.20 acres of RW for the Shady Lane cul-de-sac and another 0.08 acre for Wesleyan Drive are approximated for total of 0.28 acres are necessary.

ALTERNATE 2.2: Connect Existing Streets (A-26)

This alternative provides an approximately 454-foot long new road connection meeting new local rural road construction requirements. TCHD rural estate subdivision road criteria shown in Table 1 are applicable and most cost effective. The values are used in exhibits and for cost estimating purposes. The same pavement section as described in Alternative 1.2 is used for this street connection. The new road segment includes a horizontal curve meeting the 200-foot minimum requirement and new drive approaches to new pavement.

Utility impacts expected are the same as mentioned in Alternate 2.2

New 52-foot minimum RW is typical but adjustments along the south and east side should be considered to reduce amount of RW to acquire and trees removed from the eastern parcel. Additional RW from the same two (2) parcels as the Shady Lane cul-de-sac shown in the initial layout is estimated at 0.42 acres.

3. WATER MAIN LOOP CONNECTION

This alternative (A-27) is independent of the other alternatives as it is unrelated to transportation and the existing road network. It provides a new water line connecting the existing water lines terminating at the end of each street. Existing water line pipe sizes have not been confirmed, but are assumed to be 8-inch diameter ductile iron pipe. Approximately 380-ft. of new pipe and a water valve is estimated.

For Alternative 2.1, the utility easement falls between new RW for the cul-de-sacs. The water line for Alternative 2.2 is proposed on the west side of the new road connection outside the edge of pavement within the acquired RW.

For this report, the cost estimate provided assumes the waterline connection is a stand-alone project. A 15-foot wide utility easement from Shady Lane RW to Wesleyan Drive RW for approximately 380-feet is factored in.

COST ESTIMATE

The construction cost estimates consider major pay items and a contingency for other miscellaneous items. A summary of estimated project costs are in Table 2 below:

Item Description	STUDY AREA 1 Altern. 1.1 Next Maintenance Treatment	STUDY AREA 1 Alternate 1.2 Widen Existing	STUDY AREA 1 Alternate 1.3 New Connection	STUDY AREA 2 Alternate 2.1 Cul-de-sac	STUDY AREA 2 Alternate 2.2 Connection	Water Line Connection Standalone
Engineering		\$18,000	\$18,000	\$18,000	\$18,000	\$8,000
Right-of-Way	-	\$9,000	\$13,000	\$9,000	\$15,000	\$4,000
Construction	\$7,000	\$70,000	\$108,000	\$86,000	\$76,000	\$48,000
Project Total	\$7,000	\$97,000	\$139,000	\$113,000	\$109,000	\$60,000

Table 2: Cost Estimate Summary. See cost estimates in Appendices A-28 thru A-33.

Reviewing Study Area 1 estimates, Alternate 1.1 is the lowest cost alternative and will upgrade the deteriorated pavement section. The underlying problems causing accelerated pavement deterioration are expected to continue.

RIGHT-OF-WAY SUMMARY

Proposed right-of-way requirements presented in this Preliminary Engineers Report are approximate, developed using limited information available in the context of this study. More refined right-of-way limits are generated should a project go forward for development.

RIGHT-OF-WAY SUMMARY						
Parcel Key #	Property Owner	Existing Parcel (acres)	Alternative 1.1 Widen Existing	Alternative 1.2 New Access		
			Proposed RW (acres)	Proposed RW (acres)		
154081000029	Koehler Ronald D Marsh Cindy Kay	4.06	0.28	0.39		
			Alternative 2.1		Alternative 2.2 Road Connection	Alternative 3 Water Connection
			Shady Lane C-d-S Proposed RW (acres)	Wesleyan C-d-S Proposed RW (acres)	Proposed RW (acres)	Proposed Easement
154082000072	Koehler Ronald D Marsh Cindy Kay	4.63	0.20	0.08	0.38	15' X 330'
154082000260	Stevenson Ashley & Lisa	10.25	-	-	0.04	-

Table 3: Right-of-Way Summary

Alternate 1.3 essentially splits the existing 4.06 acre parcel into two parts. The northern part becomes approximately 2.50 acres while the southern part becomes approximately 1.17 acres. Alternative 3 is

presented showing a new utility easement to acquire. An easement would not be required with Alternate 2.3 since the water line falls within new RW for the road extension.

CONCLUSIONS AND RECOMMENDATIONS

Study Area 1

Alternate 1.1 – No geometric improvement; next maintenance treatment alternative will not address the poor road geometrics or inadequate sight distance approaching and through the reverse curves. It **does not satisfy the purpose** of the project to improve safety, operational deficiencies and serviceability.

Alternate 1.2 – Widening the existing road alternative to minimum standards fully **satisfies the purpose** and addresses the needs. Sight lines would be free of obstructions and vehicles are able to comfortably pass each other safely. Vehicles with larger turning paths will be able to navigate the curves without leaving the pavement.

Alternate 1.3 – A new connection to Dayton Road alternative also **satisfies the purpose** and addresses the needs. Like Alternate 1.2, clear sight lines would be established. The 4-foot earth shoulder and ditch width will be clear of obstructions. The proposed intersection with Dayton Road is level giving ample intersection sight distance.

Both Alternate 1.2 and 1.3 satisfy the purpose and need; however, **Alternate 1.2 is recommended** between the two alternates for the following reasons:

- It is the lowest cost alternative that satisfies the purpose and need.
- The established intersection with Dayton Road remains unchanged. The look and feel at the subdivision entrance and approach is not lost. The mature landscaping can't be replicated at a new entrance.
- A curvy entrance road theme is maintained for the subdivision.
- Alternative 1.3 essentially splits the existing 4.06-acre unimproved vacant property in half limiting land use opportunities; whereas, Alternative 1.2 crosses a corner of the parcel.
- There is less of a land disturbance during construction.
- It requires the least amount of new RW.

Additional Considerations:

- For Alternative 1.1, accelerated pavement deterioration within the curves can be attributed to poor drainage. Pavement has difficult time drying out regularly as the tree canopies block the sun and during winter months, holds moisture during freeze-thaw cycles.

- Alternate 1.1 is by far the lowest cost alternative and will upgrade the deteriorated pavement section to like new condition. The underlying problems causing accelerated pavement deterioration are not fixed with this option.
- For Alternative 1.2, 3R Design Standards allow of design exceptions for non-conforming design criteria. Design exceptions for pavement width, sight distance and obstruction free zone width, if validated, would allow options to improve the existing corridor without having to meet these minimum standards.
 - A crash analysis was not part of the scope of work in preparing this Preliminary Engineers Report. No crash evidence was found at the initial assessment field check and local authority has no recollection of any crashes.
 - Impacts to existing trees are minimized
 - Project cost is reduced
- Offering existing RW no longer serving a public purpose for new RW needed for the improvements could help defray the cost of new RW

Study Area 2

Alternate 2.1 – The cul-de-sac option at both dead end roads **only partly satisfies the purpose**. Operational improvements result by adding turn around capabilities, so improving these deficiencies are achieved. One can say safety is improved by providing a means to avoid large vehicles backing down the street; however, emergency responders still only have one entrance to use. Connectivity is still not provided with access still limited to one entrance.

Alternate 2.2 – Connecting existing streets **satisfies the purpose**. Subdivision access to Dayton Road would be served by two access locations allowing continued access to properties should a blockage occur. The need for vehicles to turn around is eliminated with a connected street. Safety is improved when potential blockages are eliminated, large vehicles are continuing forward and emergency responders have two directions to enter from.

Alternate 3 – The only way to satisfy the secondary purpose of the project is to provide a water line connection between the two dead end lines. This alternative can be installed as a stand-alone project or included another improvement alternative. Water supply circulation and water quality of the service area is significantly improved. Water pressure needed for firefighting is greatly improved.

Only Alternate 2.2 fully satisfies the purpose and addresses the needs. The cost for this alternative is around \$10,000 less than the cost for two (2) cul-de-sacs and gains connectivity. The reduced cost is mostly due to less pavement area for the alternative. As such, **Alternate 2.2 is the recommended** alternative for Study Area 2.

Additional Considerations:

- A “hammerhead” cul-de-sac alternative for dead end street application allows for vehicles to turn around on appropriate pavement without using a private drive. The turn-around procedure requires backing up while staying in the public RW.
 - This option helps commercial vehicles stay off private drives but does not allow school buses to turn-around moving forward.
- The maximum speed for a curve radius of 40-feet is 15 MPH. A safety improvement mitigation measure can include placing a 15 MPH advisory speed warning sign in advance of the curves.

Submitted by : _____ Date: _____

Mark A. Albers, P.E., Sr. Project Manager
VS Engineering, Inc.

ATTACHMENTS

APPENDIX

Vicinity Map	A-1
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