State Route 28 Corridor Improvements

Branch Hill - New Guinea Pike to Goshen Road

PID 82563

Clermont County, Ohio

Purpose and Need Statement

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REVISED DRAFT

Prepared for:

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1.0 INTRODUCTION

The Clermont County Transportation Improvement District (CCTID) was established in June 2006, by the Board of Clermont County Commissioners to foster increased collaboration with local partner jurisdictions, and other county, regional, state and federal agencies to implement a regional approach to transportation improvements in support of economic development in Clermont County. In January 2008, CCTID initiated the State Route 28 Corridor Improvements project, to examine transportation infrastructure needs and future economic development potential along approximately four miles of State Route 28 (SR 28) in Miami Township and Goshen Township.

> The purpose of the project is to develop a plan for the implementation of infrastructure improvements and policies designed to improve mobility and safety, and to support future development in the corridor.

The project will consider both physical improvements to the roadway and its connections and assist the county and townships in developing policies to manage future growth in this dynamic corridor.

A purpose and need statement identifies the range and magnitude of issues to be addressed by a project or plan. It serves as the foundation on which the project development process is built.

This document summarizes the purpose and need for improvements to the corridor. The document describes the history of the project and identifies the needs that the CCTID seeks to address in the study. This document will guide the development and evaluation of policies and alternatives, the development of an implementation plan, and a recommended program of projects that can be incorporated into the County's Thoroughfare Plan and the region's long-range transportation plan. As development occurs in the corridor and improvements are warranted, individual projects will be progressed through the environmental, engineering, and construction phases.

2.0 PROJECT OVERVIEW

The SR 28 Corridor Improvements project is evaluating approximately four miles of SR 28, from Branch Hill-Guinea Pike in Miami Township to Goshen Road in Goshen Township. The study area for the project, shown in Figure 1, encompasses the area in which both transportation and land uses were evaluated.

2.1 Project History

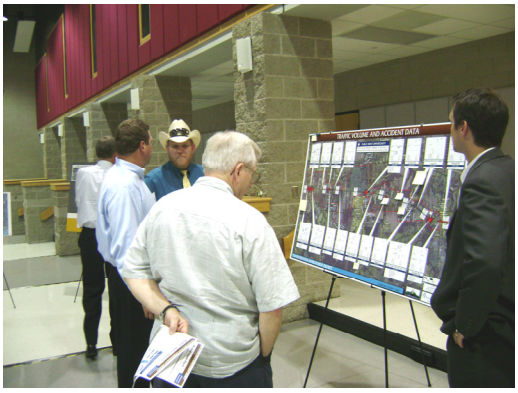
Designated as a State Route in 1926, SR 28 stretches 70 miles, from Milford to Chillicothe, Ohio and serves as the primary east-west arterial in northern Clermont County. Improvements to the SR 28 corridor have been considered at various times over the last several decades as development in the Cincinnati metropolitan region has spread and Clermont County experienced rapid growth. To the west of the project limits, SR 28 and Business 28 serve as a Main Street for Miami Township, traversing its retail core. In 2007, the Ohio Department of Transportation (ODOT) completed a project that widened SR 28 to four lanes, from Bypass 28 to Branch Hill-Guinea Pike.

The CCTID, through this project, is taking a proactive look at the next major segment of SR 28 to ensure that appropriate plans and infrastructure are in place as the corridor continues to develop. In January 2008, the CCTID and the Clermont County Engineer's Office (CCEO) initiated the project and began meeting with stakeholders in the corridor. Early meetings were held with representatives from Clermont County and Miami and Goshen Townships to discuss preliminary project goals and potential concerns. At the same time, initial traffic and

environmental surveys were completed to assess existing conditions and constraints. A *Red Flag Summary Report*, addressing both environmental and design constraints was completed in March 2008.

Public Outreach

The project initiated its broader public outreach efforts with a public open house, held on August 18, 2008 at Goshen High School. The meeting featured informational displays designed to introduce project stakeholders to the proposed goals of the project, provide the results of completed preliminary analyses, and introduce land use and transportation concepts that will be integral to the project as it moves forward. Input was gathered from attendees through direct comments on the display boards (using sticky notes), a comment form, and through conversations with project staff. Attendees were also provided with a handout summarizing the display boards to take home and share with other stakeholders.



Project Team members discuss the project with open house attendees.

Stakeholders concurred with the proposed project goals, emphasizing those that addressed planning for the future transportation and economic development needs of the corridor. Comments also identified a wide range of recommended transportation improvements, including the addition of signals and/or turn lanes at key locations and the need to reduce the number of access points. Several comments addressed the need to consolidate the roadway's intersections with of Woodville Pike and Branch Hill-Guinea Pike, and Donna Jay Drive and Deerfield Road. Several additional comments called for the provision of pedestrian facilities. Concerns focused on the need to maintain the community's character, improve the visual quality of the corridor, and to utilize zoning to manage growth.

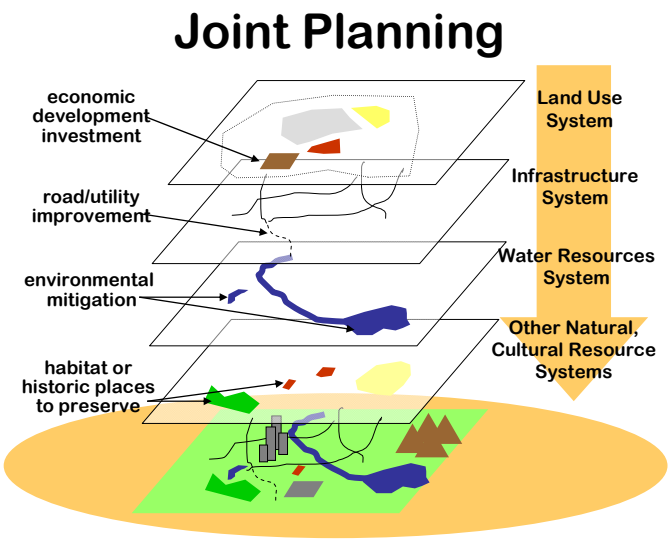
Additional information regarding the public open house can be found in the *Summary of Public Open House* #1 (September 2008). The project team will continue to keep the public informed of the project's progress and will consult them at major decision points throughout the project.

The implementation plan that is developed through this process will be incorporated into the Clermont County's Thoroughfare Plan, which must be adopted by the Planning Commission. In addition to the public outreach to be conducted by the project team in the plan's development, adoption of the plan will go through the formal Planning Commission process, with its opportunities for broad public input.

Planning Context

The federally mandated metropolitan planning process, most recently updated by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), requires that transportation planning be coordinated at the regional and state levels. SAFETEA-LU (Section 6001) requires that Metropolitan Planning Organizations (MPOs), the federally-designated planning organizations for urban areas with populations greater than 50,000, consult with local and state officials responsible for land use management, natural resources, environmental protection, conservation, and historic preservation in developing a long-range transportation plan for the region. MPOs are further encouraged to consider a "joint planning" approach that integrates infrastructure planning with economic development and environmental protection.

The planning effort underway in the SR 28 corridor is utilizing this joint planning approach to develop a comprehensive corridor plan that will guide and encourage future development, while maintaining the character and quality of the community. Transportation plans are not being developed in isolation. The project is part of the CCTID Regional Transportation Improvement Program, adopted in February 2007, developed in response to the Eastern Corridor Tier 1 Record of Decision that advanced multi-modal transportation improvements connecting Clermont County with the region's core. The regional transportation improvement program includes corridor-level projects and supporting program-level implementation strategies and activities focused on the SR 28 and SR 32 corridors. CCTID intends to implement this program of projects by pooling funds from a range of sources available to the county, including tax revenues, tax increment financing and loans, to provide the local match required to leverage federal funds.



Joint Planning takes a holistic approach to planning infrastructure and economic development

The comprehensive approach being undertaken in this plan is also in keeping with the Strategic Regional Policy Plan (SRPP), adopted by the Ohio-Kentucky-Indiana Regional Council of Governments' (OKI), the region's MPO, in April 2005. That plan identified a lack of coordination among transportation planning, land use planning capital budgeting, and economic development within the region and called for the creation of plans that link these programs, as well as housing, natural resources, and public facilities. The SRPP also identified the need to promote multimodal transportation choices, especially for the transportation disadvantaged and also for funding priority to be given to projects encourage the efficient use of existing arterial and collector roadways, with an emphasis on access management. The planning effort undertaken by this project is in harmony with the objectives established in the SRPP.

The corridor plan that is produced by this project will be incorporated into Clermont County's Thoroughfare Plan. Once adopted by the Clermont County Planning Commission, the plan will be advanced to OKI for inclusion in the region's long range plan.

2.2 Study Area Description

This section provides an overview of the project area, its transportation system, and land use and development patterns.

Corridor Setting

The SR 28 corridor is one of several east-west corridors that radiate out from I-275 through Clermont County. Running north-south along the western edge of the County, I-275 serves as the primary connection between Clermont County and the other major radial corridors in the region, including I-71, I-75, and I-471, and via these corridors also connects Clermont County to downtown Cincinnati. While development in the corridor dates to the 19th century, modern waves of development came to the corridor following World War II and more recently in the late

1990s and early 2000s as regional activity centers migrated out of the city and people sought affordable homes in a more rural/suburban setting.

West of I-275, SR 28 connects to Milford, a historic village on the Little Miami River that dates to the early 1800s, where it terminates at its intersection with US 50, which continues through Terrace Park, Mariemont and other east side neighborhoods on its way to downtown Cincinnati.

East of I-275, SR 28 splits into Business 28, the original alignment of SR 28, and Bypass 28. The two roadways run parallel for approximately 1.5 miles before rejoining and continuing as SR 28. Bypass 28 was constructed by the CCEO to allow Business 28 to serve local traffic accessing Miami Township's retail core. In 2004, Clermont County and ODOT reached an agreement to exchange ownership and maintenance responsibilities for the two roadways, with ODOT assuming responsibility for Bypass 28 and Clermont County taking control of Business 28. While Business 28 is currently dominated large strip developments and other auto-oriented uses, plans for the area include creating a mixed-use town center, with a traditional grid street pattern, and converting SR 28 into a pedestrian-friendly boulevard. CCEO is currently developing plans to make improvements to the western portion of Business 28 that will be consistent with this plan; construction is planned to start in 2010.

Bypass 28 is a 4-lane, limited-access roadway with a single interchange at Wolfpen-Pleasant Hill Road. At either end, Bypass 28 connects to SR 28 at a signalized intersection. East of this connection, SR 28 was recently widened to five lanes – two lanes in each direction and a center turn lane – up to Branch Hill-Guinea Pike, where this project begins.

Beyond the project limits, SR 28 continues as a two-lane rural highway connecting to the towns of Blanchester, Martinsville, New Vienna, Leesburg, and Greenfield, before terminating at its intersection with US 50 near Chillicothe. Land uses between the project limits and Blanchester are primarily large lot residences and agricultural.

Existing Transportation System

Within the project limits, SR 28 is classified by ODOT as an Urban Minor Arterial and has two lanes with limited signals, turn lanes, and shoulders. East of Branch Hill-Guinea Pike, the roadway narrows from five lanes, where the recent widening project terminated, to two lanes, which continue throughout the project area. The legal speed limit on SR 28 is 45 mph from the western end of the project area to just east of Donna Jay Drive, 55 mph from just east of Donna Jay Drive to Snider Road, and 45 mph from Snider Road to the eastern end of the project area.

Within the project limits SR 28 has signalized intersections with Woodville Pike, Branch Hill-Guinea Pike, the north leg of SR 48, SR 132/Dick Flynn Boulevard, and Goshen Road. All other intersecting roadways are controlled by stop signs where traffic on SR 28 is not required to stop. Turn lanes are provided on SR 28 for a limited number of intersections within the corridor and only 0.4 mile segment between SR 48 (north) and SR 48 (south) has a center turn lane. Outside of the travel lanes, there is typically a 4-foot shoulder and drainage ditches on either side of the roadway.

Land Use and Population

The corridor and Clermont County are in the midst of an urbanization process that began several years ago and is expected to continue well into the future. Much of the growth has come from households seeking new homes in suburban settings that offer a quality lifestyle and close proximity to urban amenities and workplaces. However, this urbanization, particularly in the Goshen Township portion of the study area, is still in its early stages so the setting is still "rural" in character.

As shown in Table 1, as the State of Ohio and the Cincinnati Consolidated Metropolitan Statistical Area (CMSA) have experienced modest growth over the last 30 years, Clermont County has more than doubled in population. To date, much of this growth has occurred in Union and Batavia Townships along the SR 32 corridor, and within the SR 28 corridor in Miami Township.

TABLE 1: STUDY AREA POPULATION TRENDS

Jurisdiction	1970	1980	1990	2000	2006
State of Ohio	10,652,017	10,797,630	10,847,115	11,353,140	11,478,006
Cincinnati CMSA[1]	1,668,420	1,726,451	1,817,569	1,979,202	2,133,678[2]
Clermont County	95,725	128,483	150,187	177,977	192,706
Miami Township	17,683	23,382	28,199	36,632	39,619
Goshen Township	n.a.	n.a.	12,660	13,663	16,052

[1]The Cincinnati CMSA includes Brown, Butler, Clermont, Hamilton, and Warren counties in Ohio; Boone, Bracken, Campbell, Gallatin, Grant, Kenton, and Pendleton counties in Kentucky; and Dearborn, Franklin, and Ohio counties in Indiana.

[2]Estimate is for 2007.

Sources: U.S. Census Bureau; *Imagine Miami: Vision 2025 Comprehensive Plan*; "A Market Study of the State Route 28" by Gem Public Sector Services, August 17, 2007.

The existing State Route 28 project study area features a diverse mix of existing land uses ranging from low intensity agricultural land to higher intensity commercial and light industrial/ assembly land uses. The study area also features parcels in virtually all phases of the development life cycle, including undeveloped "raw" land, newly constructed commercial and residential developments, and older structures and land uses that have entered various stages of deterioration and thus represent prime redevelopment opportunities going forward.

Outside of "downtown" Goshen, which dates to the early and mid-1800s, most of the SR 28 corridor was developed during the 1950s and 1960s as single family homes on deep lots. Many

The SR 28 corridor includes a wide range of uses of various ages and condition

of these homes have since been converted into free-standing businesses, while some have been redeveloped into small commercial strips.

Similar to the existing land uses in the corridor, the existing zoning classifications permit a wide range of types and densities, from low-density residential districts through a range of commercial and industrial districts. Within Miami Township, about 55 percent of the land area within the corridor is zoned commercial and about 35 percent is zoned single family residential. The remaining 10 percent is zoned for planned residential or industrial developments. In Goshen Township, the range of zoning districts varies more widely, but the distribution is similar. Approximately 30 percent of the land area is zoned residential, 32 percent is zoned general business, and 24 percent is zoned for planned residential, commercial, or mixed uses.

3.0 CORRIDOR NEEDS

The sections below describe specific needs for the corridor; some of these needs are immediate, others will develop or exacerbate as the corridor grows. Localized congestion and safety issues caused by the high number of access points need to be addressed today. There is also an existing, although limited, immediate need for facilities to support pedestrian, bicycle, and transit modes of travel. That need, along with improvements to handle the demand associated with planned land uses and intensities, will intensify as the corridor develops. This evolving demand for improvements in the corridor is the reason that the focus of the project is on developing an implementation plan, rather than a single improvement project, and is reflected in the project purpose:

> The purpose of the project is to develop a plan for the implementation of infrastructure improvements and policies designed to improve mobility and safety, and to support future development in the corridor.

3.1 Support for Future Development

Clermont County and the SR 28 corridor have grown substantially over the last several decades, a trend that is expected to continue. However, without improvements, the type and quality of development envisioned in land use plans for the corridor may not be accommodated.

According to OKI, Clermont County is projected to add an additional 55,000 residents from 2005 to 2030, an increase of 28 percent. As Miami Township approaches full build out, it is likely that urban growth and development will begin to spill over into Goshen Township, with the path of growth likely to follow the SR 28 corridor. According to a market analysis conducted for Goshen Township by Gem Public Sector Services, growth in Goshen Township between 2000 and 2011 is projected to be more than three and one-half times the growth that occurred in the township between 1990 and 2000, resulting in nearly 4,000 additional residents.

Growth in both the SR 32 and SR 28 corridors would be supported by the implementation of the Eastern Corridor Study's proposed highway and transit improvements. The Eastern Corridor Study, a partnership of ODOT, Clermont and Hamilton Counties, the City of Cincinnati, OKI and the Southwest Ohio Regional Transit Authority, has identified feasible alternatives for new highway and rail capacity between the City of Cincinnati and Clermont County. New highway capacity would improve the connection between I-71 (via Red Bank Road) on the eastern edge of Cincinnati and the SR 32 corridor. New rail transit service, using mostly existing freight rail right-of-way, would connect downtown Cincinnati and the City of Milford. These improvements would drastically improve the connection between Miami and Goshen Townships and downtown Cincinnati, increasing the attractiveness of the SR 28 corridor for future development. Both the highway and transit improvements are in the region's fiscally-constrained long range plan and are in the preliminary engineering/draft environmental impact statement phase.

Both Miami and Goshen Townships have developed land use and transportation plans to accommodate and manage the expected growth in the SR 28 Corridor. Miami Township's plan calls for properties fronting on SR 28 to be a mix of commercial and office uses, with the properties behind them to remain residential. The *Imagine Miami: Vision 2025* plan identifies SR 28 as a "Primary Arterial," which is shown as having a typical section of four lanes divided by a landscaped median. It also identifies Branch Hill-Guinea Pike, currently two lanes, as a "Secondary Arterial," with a four-lane, undivided cross section, between SR 28 and Wards Corner Road.

Goshen Township recently completed a *State Route 28 Corridor Development Plan*, an attempt to take a proactive approach to planning for the corridor. The plan also sets forth the first detailed visions and plans for a unique Goshen Town Center located at the intersection of State Route 28 and Goshen Road. The plan recommends land use, zoning, transportation and economic development related strategies and policies to guide and promote high quality land uses that will serve to increase the Township's tax revenue base. The plan identifies the critical need to promote an efficient transportation corridor to avoid the effects of uncontrolled corridor growth such as congestion, increased accident rates and stagnant or declining property values. The corridor plan projects increased demand for office space, but that development will continue at a slow pace until the critical mass of residential development needed to support a primary trade area is reached.

The plan calls for the creation of a "Commercial Gateway District," featuring commercial development for all parcels fronting SR 28 from the Goshen Township line to just west of SR 132/Dick Flynn Boulevard. East of the commercial district, the plan calls for the creation of a "Goshen Town Center" consisting of the traditional core of Goshen Township, with the goal of creating a mixed-use "destination." To the east of the town center (and the limits of this project), the plan calls for the creation of an "Agricultural Preservation District," where uses would be limited to low-density residential and agricultural uses, with limited public utilities.

The SR 28 Corridor Development Plan calls for the creation of a pedestrian-friendly town center in Goshen.

The plan calls for SR 28 through the commercial district and the town center to include four lanes with a landscaped median. East of the town center, the plan calls for maintenance of the existing two lane section with improvements limited to provisions for bicycles and pedestrians. The change in planned development uses and density between the Goshen Town Center and the Agricultural Preservation District and the plan's recommendation for the design of SR 28 are the basis for the selection of Goshen Road as the eastern terminus of this project.

Land Use – Transportation Connection

Land use decisions affect transportation needs and transportation improvements, in turn, affect land use decisions. Freeway interchanges and arterial road junctions frequently become focal

points for new shopping centers, industrial parks and office complexes. Urban and suburban arterial roadways are lined with new development opportunities.

Rapid, often unplanned, development has frequently been the source of major problems for both local and state transportation systems: buildings have often been constructed close to the roadways, making future capacity expansion difficult and costly; and too many access points onto roadways have resulted in vehicle conflicts, reduced safety and a general deterioration in traffic flow. Once areas have been fully, or even partially, developed, there is often little that can be done to alleviate these problems.

The SR 28 Corridor is at a critical juncture in its development and a limited window of opportunity exists to plan for that growth. As described above, the corridor is expected to develop – and redevelop – substantially over the next two decades. The plans and controls in place when development occurs will determine the character and functionality of the corridor. Appropriate land use and transportation planning will also encourage the type of land uses attracted to the corridor.

Corridor Preservation

Corridor preservation is a means of coordinating transportation planning with land use planning and development. Its goal is to prohibit, or at least minimize, development in areas which are likely to be required to meet transportation needs in the future. These areas include: lands adjacent to existing roadways which are projected to require capacity expansion; areas which might be needed to construct entirely new routes for urban bypasses or to serve new neighborhoods or commercial developments; and land needed for bicycle, transit, freight and pedestrian facilities (e.g. bikeways, walkways, transit turnouts, and bus ways). When corridors are preserved in advance, negative land use and social impacts, as well as the costs of transportation improvements, are minimized. However, when land is not preserved for future needs, disruption of residences and businesses is a frequent result and the cost of obtaining the land to accommodate improvements is likely to be considerably higher. In some cases, the needed improvement cannot even be made because the disruption and cost would be too great.

The full program of planned transportation improvements needed in the future does not need to be built now, but a plan is needed to preserve the right-of-way required for future transportation needs along the SR 28 corridor, before development occurs and transportation solutions become more costly, in both financial and social terms, to build.

3.2 Delay/Congestion

This section summarizes travel conditions on SR 28 within the project limits. The primary measurement of operating conditions is level of service (LOS), which is a qualitative measure of operational conditions of a roadway, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. Six LOS are defined for each type of facility. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions.

Highway Capacity Software version 5.21 (HCS) was used to evaluate the operational conditions of the SR 28 roadway as well as two key intersections in the corridor. HCS is based on methodology presented in the *Highway Capacity Manual* (HCM), published by the Transportation Research Board, and is a widely used traffic/transportation tool that is well adapted for the evaluation of individual roadway segments and intersections.

ODOT's "Policy for Applying Level of Service and Volume-to-Capacity Ratio in the Transportation Development Process"[1] was used to identify locations where improvements are needed to adequately accommodate the traffic volumes. According to the policy, ODOT recommends that within MPO areas, capacity-adding projects should provide for at least LOS C conditions in the build year.

For two-lane highways, the vehicle-to-capacity (V/C) ratio is used as a secondary measure of operating conditions. A V/C ratio closer to zero generally represents free-flowing conditions with minimal congestion. As the V/C ratio approaches 1.0, traffic becomes more congested and unstable. Ratios greater than 1.0 indicate that traffic volume exceeds capacity.

The traffic analysis provided below is based on traffic counts (tube counters and manual turning movement counts) taken by the project team in March and April 2008. These counts provided the basis for the Existing Conditions analysis. Because any improvements would be designed to address not just current needs, but also those of the future, traffic analysis was also completed for a future "No Build" condition. Typically for roadway projects, No Build analysis is based on projected conditions 20 years in the future and includes all programmed improvements, except the facility under consideration. For this project, 2030 was selected as the "build" year. Later in the project development process, when improvement alternatives are developed, this No Build condition will serve as a baseline for comparison.

To estimate traffic volumes in 2030, the project traffic counts were provided to HNTB Corporation, CCTID's on-call traffic modeling consultant. HNTB Corporation utilized the regional Travel Demand Model developed and maintained by OKI. The OKI Travel Demand Model is a state-of-the-practice model that uses the standard four phase sequential modeling approach of trip generation, distribution, modal choice, and assignment. The model uses demographic and land use data and capacity and free-flow speed characteristics for each roadway segment in the network to produce a "loaded" highway network with forecasted traffic volumes with revised speeds based on specified speed/capacity relationships.

Analyses were completed for the AM and PM peak hours, which were determined based on the traffic counts taken by the project team. The AM peak hour was determined to be 7:00 – 8:00 AM; the PM peak hour was determined to be 5:00 – 6:00 PM.

Roadway Segments

Capacity analyses were performed on SR 28 within the project limits using the HCM Urban Streets methodology, which uses average through-vehicle speed for the segment to estimate the Level of Service. The corridor was divided into two segments, splitting the corridor at SR 48 (south leg), based on projected traffic volumes, such that volumes throughout each segment were relatively consistent.

As shown in Table 2, existing peak hour, peak direction traffic currently operates at acceptable levels of service with average speeds of approximately 40 mph; however, traffic volumes, particularly in the western section of project area are approaching the capacity of the roadway.

[1] Ohio Department of Transportation, "Policy for Applying Level of Service and Volume-to-Capacity Ratio in the Transportation Development Process," Policy No: 322-002(P), February 1, 1998.

TABLE 2: EXISTING ROADWAY CONDITIONS

Roadway Segment	Peak Hour - Direction	Volume to Capacity Ratio (v/c)	Average Travel Speed (mph)	LOS
Western Section Branch Hill-Guinea Pike to SR 48 South	AM – Westbound	0.86	40.4	B
	PM – Eastbound	0.91	39.8	B
Eastern Section SR 48 South to Goshen Road	AM – Westbound	0.71	39.6	B
	PM – Eastbound	0.81	38.6	B

Comparable analyses were completed for the project's build year of 2030. The results provided in table 3 indicate that with no modifications to SR 28, conditions will deteriorate to unacceptable levels, with average speeds below 15 mph throughout the corridor.

TABLE 3: NO BUILD ROADWAY CONDITIONS

Roadway Segment	Peak Hour - Direction	Volume to Capacity Ratio (v/c)	Average Travel Speed (mph)	LOS
Western Section Branch Hill-Guinea Pike to SR 48 South	AM – Westbound	1.42	14.6	F
	PM – Eastbound	1.60	11.4	F
Eastern Section SR 48 South to Goshen Road	AM – Westbound	1.35	11.3	F
	PM – Eastbound	1.44	9.6	F

Access Points

Besides high traffic volumes, a key factor in the poor operating conditions of SR 28 within the project limits is the excessive number of access points in the form of residential and commercial driveways. Excessive access points reduce the efficiency of the roadway and frequently lead to higher accident rates for both motorized and non-motorized road users. Further, such a condition makes it difficult for users to enter and exit the access points, discouraging travel and patronage of businesses within the corridor. Concern regarding the high number of access points was raised by numerous stakeholders attending the public open house, both in terms of safety and accessibility to local businesses.

The ODOT *State Highway Access Management Manual* provides guidelines for access to various types of state roadways. SR 28 falls within Access Category III, which is defined to include highways intended to provide mobility at moderate to high speeds, volumes, and distances for interregional, intercity, and intra-city travel. Almost all of the driveways within the project limits are categorized as Medium or Low volume, with 100-200 and 5-100 trip ends (vehicles entering or exiting) per peak hour, respectively. The manual recommends that, on a roadway with a 45 mph speed limit (the case for most of the project limits), such driveways should be located no closer than 360 feet apart (or approximately 15 driveways per mile per direction) to allow for safe stopping sight distance. As shown in Table 6, SR 28 far exceeds the ODOT standards for access points, with several segments including more than 25 access points per direction.

TABLE 4: ACCESS POINTS

Roadway Segment	Length (miles)	Direction	Access Points	Access Points/Mile
Buckwheat Road to Branch Hill-Guinea Pike	0.36	Eastbound	9	25
		Westbound	11	31
Branch Hill-Guinea Pike to Donna Jay Road	0.68	Eastbound	17	25
		Westbound	11	16
Donna Jay Road to Smith Road	0.37	Eastbound	12	32
		Westbound	6	16
Smith Road to SR 48 (North)	1.03	Eastbound	24	23
		Westbound	11	11
SR 48 (North) to SR 48 (South)	0.40	Eastbound	10	25
		Westbound	12	30
SR 48 (South) to SR 132	1.18	Eastbound	22	19
		Westbound	14	12
SR 132 to Goshen Road	0.22	Eastbound	2	9
		Westbound	2	9
Goshen Road to Cozaddale Road	0.74	Eastbound	6	8
		Westbound	4	5

Note: For the four-lane section (Buckwheat Road to Branch Hill-Guinea Pike) each direction is analyzed independently; for the two-lane section, the two directions are combined.

The Clermont County Engineer's Office is in the process of developing a county-specific access management plan, with publication anticipated in 2009. Both the *Imagine Miami: Vision 2025* and the *State Route 28 Corridor Development Plan* call for the use of access management techniques to control and limit the number and location of access points on SR 28. However, there is currently no mechanism in place that requires consolidation of access when a parcel is redeveloped, nor any mechanism that would force a modification of access to an existing development.

Key Intersections

Because the SR 28 intersections with Woodville Pike and Branch Hill-Guinea Pike were identified as concerns, due to delay and congestion, by both county and township staff and stakeholders attending the August 18, 2008 public open house, additional analysis was conducted for these areas. The results of this analysis, which calculated LOS for each movement (through, right turn, and left turn) at the intersection, as well as for the intersection as a whole, are summarized in Figure 2.

Note that the northbound leg at Branch Hill-Guinea Pike is actually the parking lot entrance/exit for the CVS store and that the southbound leg at Woodville Pike is the parking lot entrance/exit for Holiday Homes. As a result, these segments generate very low volumes of vehicles entering the intersections during the peak hours, 25-35 vehicles exiting the CVS and 2-5 vehicles exiting the Holiday Homes.

Table 7 provides the result of the analysis for existing operations, including average delay and LOS, for each movement and intersection. Under existing conditions, only the left turn movement from westbound SR 28 to Woodville Pike operates at LOS D or worse.

TABLE 5: AVERAGE VEHICLE DELAY AND LOS AT KEY INTERSECTIONS – EXISTING CONDITIONS

			Eastbound			Westbound			Northbound			Southbound			Overall Inter-section
			Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	
SR 28 at Woodville Pike	AM	Delay	13.7	15.4		12.1	18.0		19.2	12.7		11.7			17.0
		LOS	B	B		B	B		B	B		B			B
	PM	Delay	7.3	31.7		56.5	11.1		34.1	17.1		16.5			26.3
		LOS	A	C		E	B		C	B		B			C
SR 28 at Branch Hill-Guinea Pike	AM	Delay	35.6	6.3		12.9	24.3		19.4	19.9		21.1	24.7		22.2
		LOS	D	A		B	C		B	B		C	C		C
	PM	Delay	19.2	11.9		17.6	29.0		15.6	15.5		29.4	26.6		21.6
		LOS	B	B		B	C		B	B		C	C		C

Note: Delay data are presented in seconds.

Table 8 provides the projected operational conditions for these two intersections in 2030. As shown, operations at these intersections are expected to degrade substantially, with the Woodville Pike intersection operating at LOS D in the AM peak hour and LOS F in the PM peak hour. Peak hour, peak direction through traffic (westbound in the AM, eastbound in the PM) can expect to experience an average of more than three minutes of delay. Certain individual movements are projected to operate particularly poorly:

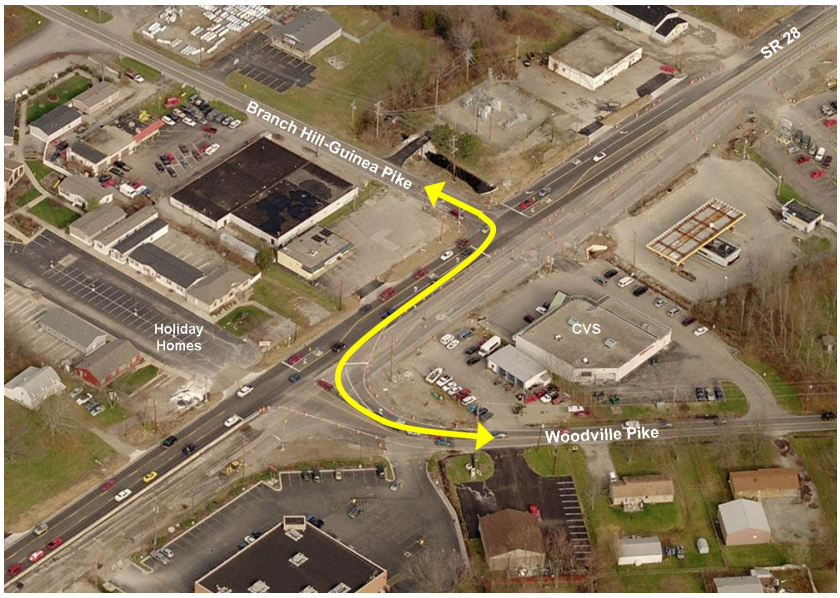
- Left turn from westbound SR 28 onto Woodville Pike in the PM peak hour – 7.1 minutes of delay.
- Through and right turn movements on eastbound SR 28 at Woodville Pike – 3.1 minutes of delay.
- Left turn from southbound Branch Hill-Guinea Pike to eastbound SR 28 – 3.1 minutes of delay.

TABLE 6: AVERAGE VEHICLE DELAY AND LOS AT KEY INTERSECTIONS – NO BUILD CONDITIONS

			Eastbound			Westbound			Northbound			Southbound			Overall Inter-section
			Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	
SR 28 at Woodville Pike	AM	Delay	30.1	24.2		21.7	55.2		64.1	16.7		14.8			44.6
		LOS	C	C		C	E		E	B		B			D
	PM	Delay	8.0	188.9		425.6	16.9		190	24.2		22.9			140.4
		LOS	A	F		F	B		F	C		C			F
SR 28 at Branch Hill-Guinea Pike	AM	Delay	79.8	4.8		14.3	155.5		31.9	32.6		39.1	187.2		116.0
		LOS	E	A		B	F		C	C		D	F		F
	PM	Delay	67.8	17.5		26.6	168.2		23.4	22.4		169.8	141.6		103.9
		LOS	E	B		C	F		C	C		F	F		F

Note: Delay data are presented in seconds.

The analysis above evaluated these two intersections independently. However, due to their close proximity to one another – they are less than 400 feet apart – two operational problems have been identified. First, the minimal distance prevents efficient coordination of the two traffic signals, resulting in inefficient traffic flow. Second, the close spacing limits the amount of vehicle storage space between the intersections and increases the potential for vehicle queues at one of the intersections to block the other intersection, which will significantly impact the operation of both intersections, particularly as traffic volumes in this area increase. Additionally, while the analysis did not quantify the number of vehicles traveling northbound or southbound "through" the intersections and therefore needing to turn right onto SR 28 and then make an immediate left to continue north on Branch Hill-Guinea Pike or south on Woodville Pike, this zigzag movement creates weaving problems as vehicles must change lanes in a very short distance.



Connections between Woodville Pike and Branch Hill-Guinea Pike require a zig-zag movement at an already congested intersection.

3.3 Transit Service

Clermont Transportation Connection (CTC) is the primary provider of public transportation in Clermont County. Founded in 1977 as CART (Clermont Area Rural Transit), it operates a Dial-A-Ride service and fixed route service as well as funding three routes operated by the Southwest Ohio Regional Transit Authority (Metro).

Existing Services

Dial-A-Ride is a door to door public transit service which operates very similar to a taxi cab. Passengers call the dispatching office and schedule a ride on one CTC's buses. The service is open to any person in Clermont County and operates from 6 a.m. to 6 p.m.

CTC operates two types of fixed route service: express and local. Two express routes (2X and 4X) provide express service from New Richmond and Amelia to downtown Cincinnati in the US 52 and SR 125 corridors, located in the southern portion of the County, respectively. Route 1 is a local route that provides service between the Felicity and Eastgate areas on Tuesdays and Thursdays.

CTC provides funding to Metro for three routes connecting western Clermont County to downtown Cincinnati. The 82x express route runs from Union Township Civic Center Park & Ride in the Eastgate area to downtown via I-275 and I-471. The 28 and 28x routes both run between Milford and downtown, making stops along US 50 in Terrace Park, Mariemont, and Fairfax. The 28 route continues to make stops along Eastern Avenue, while the 28x runs as an express route on US 50 (Columbia Parkway) to downtown.

Planned Transit Service

CTC's *2008 Strategic Development Plan* presents the agency's plan for expanded service in the county. The plan calls for the addition of both express and local routes, the expansion of existing service, and the development of several transit hubs. A map of the planned network is shown in Figure 3. An express route is planned from the Wards Corner area to downtown Cincinnati, starting with service only from Wards Corner Road and building over time to include stops in Milford and Eastgate. Two local routes are planned for the SR 32 and SR 28 corridors; the latter is described in more detail below. The existing 1, 2X, and 4X routes are planned to expand in the number of daily trips or the extent of the route, or both. Transit hubs, which provide off-street transfer centers, shelters, and restroom facilities for drivers, are planned for the Eastgate and Milford areas; the expanded Route 1 service would provide access to an existing hub in Anderson Township.

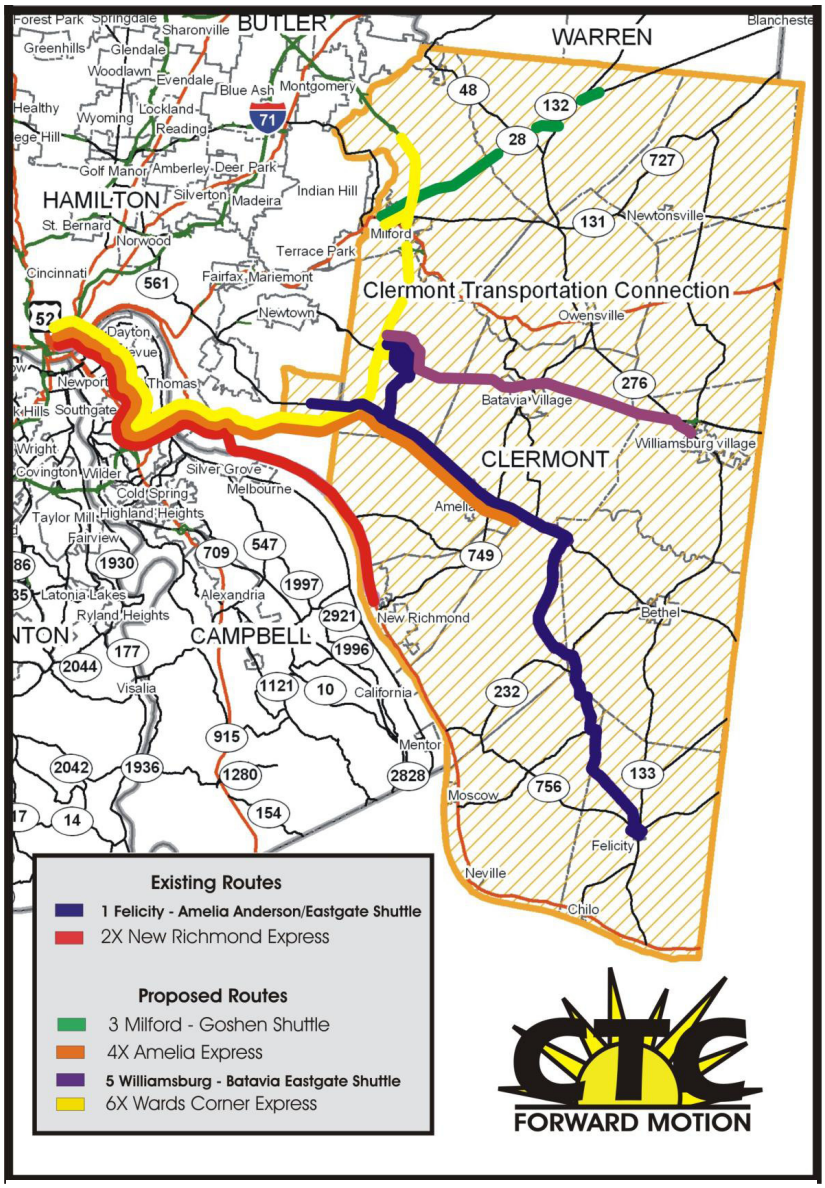


Figure 3: CTC's Planned Route Network

CTC's planned service for the SR 28 corridor will provide service from downtown Goshen to Milford and the Park 50 business park. The route, shown in Figure 4, will travel on SR 28 from Goshen to SR 48 where it will head south using SR 132, Woodville Pike and Deerfield Road to return to SR 28. From there it will proceed west along SR 28 and Business 28 into Milford and then on to Park 50 and the Rivers Edge development at Milford Parkway. At the Kroger in Milford, the route will provide a connection to the existing 28 and 28X routes operated by Metro.

The route will operate from approximately 6 a.m. to 6 p.m. with service every hour. The service will cost approximately $225,000 per year (operating and annualized capital costs) and has received a Job Access/Reverse Commute Grant to cover 50 percent of the operating costs for the first two years. Service is expected to begin in early 2009.

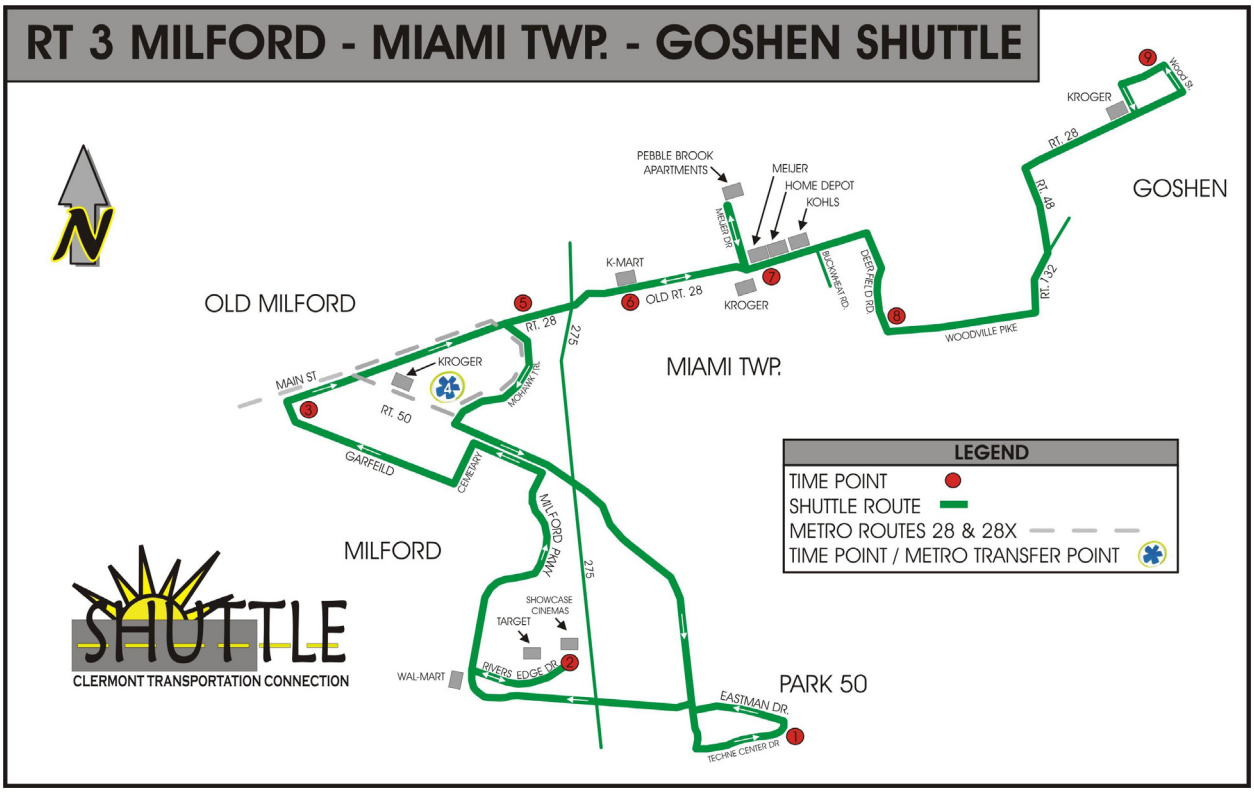


Figure 4: CTC's Planned SR 28 Route

CTC has based the need for this service primarily on the volume of requests for Dial-A-Ride service. Due to growth in population and demand for transit service, it is no longer feasible to provide Dial-A-Ride service in the corridor. For this reason, the Dial-A-Ride service regularly denies requests for daily commute trips. A regular, daily fixed route provides reliable service for commuters as well as infrequent riders.

The route would also serve several environmental justice groups in the area which include; households below the poverty line, zero car households, and persons with disabilities. As noted in the project's *Red Flag Summary*, two potential environmental justice communities were identified within our project limits: Country Lake Apartments and Lakeshore Estates Mobile Home Park. Information provided by CTC indicates that most current users of the Dial-A-Ride service are either low-income, with zero or one car in the household, or are disabled.

A primary goal of the route is to connect the Goshen area to employment centers in the Milford area. The route was designed so that bus stops would be immediately next to several large mobile home parks – Lakeshore Estates, as well as Woodville Gardens Mobile Home community on Woodville Pike. The mobile home parks house a large number of lower income citizens and the mobile home parks are not in close proximity to many employment sites.

Need for Transit Facilities

With no existing scheduled transit service in the corridor, there are no existing facilities. When the service begins next year, buses will stop within the SR 28 right-of-way at designated stops, which are to be located approximately every two to three blocks. With limited shoulders through most of the corridor, buses will stop in the travel lane, blocking traffic. Buses typically do not pull onto the shoulder as this encourages other vehicles to attempt to pass, creating a safety concern as they cross the roadway centerline. Therefore, each time the bus stops to collect or drop-off passengers, SR 28 traffic in one direction will be stopped, exacerbating existing

congestion issues. The duration that traffic is blocked will vary depending on the number of passengers utilizing the stop, but with half of CTC riders having some kind of disability, these delays could be lengthy.

At major stops, such as the entrance to an apartment or mobile home community, CTC desires the installation of bus turnouts, so that vehicles can safely pass the stopped bus, as well as minimal passenger comfort facilities such as shelters and benches. However, depending on property ownership, it is frequently necessary to purchase right-of-way to provide these facilities. Any improvements to SR 28 should be designed to accommodate the facilities required to provide safe and effective transit service to those in the corridor that need it.

As development occurs in the corridor, land uses along SR 28 are expected intensify, increasing the number of residents near the proposed SR 28 bus route. However, in order to achieve the maximum utilization of the service for daily commuting, a convenient park-and-ride facility will be needed to attract those that do live directly on the route.

3.4 Non-Motorized Accessibility

Bicycling and walking can serve either transportation (the need to get from one location to another) or recreational (traveling for pleasure or exercise) functions. These non-motorized means can be a great transportation option for short trips and a means to access transit for longer travel. Walking is a clean, healthy, and inexpensive means of travel that is available to almost everyone, regardless of income or age. Similarly, bicycling provides an effective alternative to the automobile for short to moderate length trips.

Bicyclists and pedestrians are limited to a narrow shoulder adjacent to the SR 28 travel lanes.

Because bicyclists and pedestrians are particularly vulnerable to injury by motor vehicle, allowing for – and encouraging – safe walking and bicycling, requires careful consideration in the design of streets. East of Branch Hill-Guinea Pike, the design of SR 28 reflects the area's rural history. There are no dedicated bicycle or pedestrian facilities in the corridor; the only accommodation provided is a 4-foot shoulder. With no physical separation from the travel lanes, numerous access points to cross, and speed limits of 45 or 55 mph, the shoulder provides limited safety and is certainly not a comfortable place to walk or bicycle. As a result, all but those with no other option must use their car for even the shortest trips.

Besides mobility within the corridor, walking and bicycling can provide critical access to other modes and facilities. The success of transit within the corridor depends on potential users feeling comfortable accessing transit stops and facilities that are not immediately adjacent to their origin or destination. If users feel safe and comfortable, they are willing to walk greater distances to reach transit facilities, which could reduce the number of stops required. Because CTC permits bicycles on their buses (bus bike racks are planned for the future), facilitating bicycle access can not only expand the passenger catchment area in the SR 28 corridor, it can also expand the accessible destinations at the other end of the trip.

Approximately five miles northwest of SR 28, Branch Hill-Guinea Pike intersects the Little Miami Scenic Trail, a 76-mile long paved bike trail that stretches from Newtown to Springfield. The trail, which is used by hundreds of thousands of cyclists each year, is one of the longest paved trails in the country. It is also a piece of the Underground Railroad Bicycle Route, which runs from Mobile, Alabama to Buffalo, New York. This facility provides not only a recreation function, but also generates significant tourist traffic for nearby communities. Currently there is no designated – or safe – connection between this regional resource and the SR 28 corridor.

3.5 Safety

An accident history analysis was performed to identify locations with a high number of accidents, accident patterns, accident types and conditions, and the severity of the accidents. The analysis was based on vehicle accident data for the period from January 2005 to March 2008 (3 years, 3 months) received from CCEO. The location, type, time, and severity of accidents help identify contributing causes or roadway deficiencies. Mitigating measures can be investigated and applied to rectify geometric deficiencies and help reduce future accident risks.

A total of 211 crashes were recorded within the project limits over the reviewed period. Types of accidents reported ranged from rear end collisions to turning-related crashes to crashes involving animals (*e.g.*, a vehicle hitting a deer). Because the focus of this study is on operations on SR 28, the analysis excluded those accidents that occurred on intersecting roadways (45 of the 211 crashes). Further, due to the limited number of crashes that occurred on SR 28 at non-intersection locations (12 of the 211) and the limited conclusions that could be drawn from such a small sample size, the analysis was limited to accidents that were reported to occur *at* intersections in the corridor. Note, however, that it is possible that some of the accidents reported as occurring *at* an intersection may have actually occurred outside the intersection, but that the intersection was used in the report because it was the closest point of reference.

Figure 5 identifies the number and location of reported crashes within the project limits. In order to identify trends, and any deficiencies, it is important to review these results in comparison to the number of vehicles traveling on the roadway segment as well as the frequency of accidents expected to occur on roadway of this type. ODOT has not developed average accident rates for intersections for use in such analysis. However, the project team identified a University of Cincinnati study[2] that analyzed a representative number of intersections throughout the state to

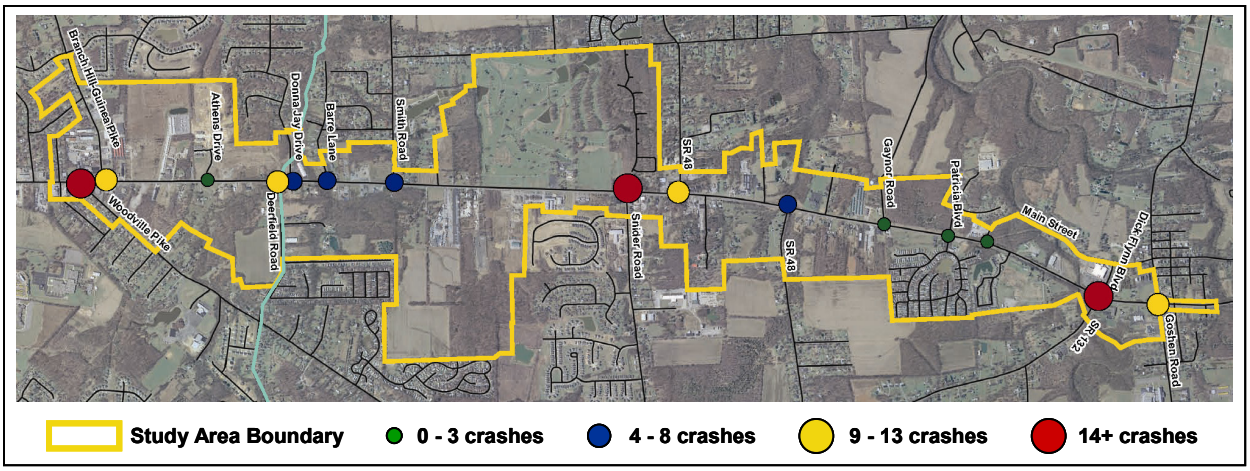


Figure 5: Crash Data

develop predicted annual crash rates for intersections of various sizes and types. These base rates were compared to the crash data collected for the SR 28 corridor and used to identify locations with higher than expected crash rates. Table 9 provides the predicted and actual annual crash rates for locations with higher than expected crash rates.

TABLE 7: HIGH ACCIDENT LOCATIONS

Intersection	Travel Direction	Crash Type	Predicted Annual Crash Rate	Actual Annual Crash Rate	Difference
Deerfield Road	Westbound	Rear End	1.02	2.77	172%
Donna Jay Drive	Eastbound	Rear End	1.02	1.23	21%
Smith Road	Eastbound	Left Turn	0.07	0.31	343%
Snider Road	Westbound	Rear End	1.02	2.77	172%
Snider Road	Westbound	Left Turn	0.07	0.31	343%

A high rate of rear end accidents may indicate the need for a left turn lane, additional signage, and/or an investigation of visibility conditions. A high rate of left turn accidents may indicate the need for a traffic signal, a revision of the speed limit, additional signage, and/or an investigation of visibility conditions.

Attendees at the public open house were asked to identify locations within the corridor that they felt were safety concerns. The issues identified by stakeholders support the findings of the crash analysis above. The most common concern related to problems turning left from SR 28 onto intersecting roadways, specifically, Deerfield Road, Donna Jay Drive, and Smith Road.

While it is impossible to estimate the number of accidents that will occur in the future based on existing rates, it is expected that these patterns will continue into the future. As traffic volumes continue to grow, it is possible that certain types of crashes, such as the left turn-related crashes, will occur at an even higher frequency.

4.0 MOVING FORWARD

The purpose and need for the SR 28 Corridor Improvements project is to address the existing congestion and safety deficiencies within the project limits, while planning for and supporting future development in the corridor. Improvements are needed within the four mile section of roadway from Branch Hill-Guinea Pike, where the 2007 improvements terminated, and Goshen Road, beyond which local plans call for maintenance of the existing rural character.

Without improvements to the transportation infrastructure in the corridor, congestion will increase and the frequent rate of accidents at certain intersections will continue and potentially worsen. The SR 28 corridor is at a critical juncture in its development. With areas to the west approaching full build out, SR 28 has the potential to provide an attractive location for the next wave of development. Goshen Township recently developed a plan for this corridor that calls for high quality, managed development, including a town center at SR 28 and Goshen Road. Without improvements to the transportation network, the desirability of this corridor will be limited and the Township's vision will not be realized.

[2] Kashayi, Nagaraju C. "Modeling Base Crash Rates for Intersections," University of Cincinnati Department of Civil and Environmental Engineering, October 2006.

Based on discussions within the project team and input from local officials and stakeholders a series of goals was developed to guide the study as it moves forward:

SR 28 Corridor Improvements Project Goals

- **To develop an access management plan for the corridor with a focus on:**
  - **Long-term safety congestion management**
  - **Economic development**
- **To provide a land-use planning tool**
- **To establish NEPA groundwork to help secure funding for infrastructure improvements**

This document will guide the development and evaluation of policies and alternatives, the development of an implementation plan, and a recommended program of projects that can be incorporated into the County's Thoroughfare Plan and the region's long-range transportation plan. As that process continues, all stakeholders – residents, property and business owners, community leaders, and local officials – will be invited and encouraged to participate in the development this plan.