

Downtown Traffic and Safety Study

Date:	December 6, 2024
To	Village of Chagrin Falls
From	CT Consultants, Inc. A Verdantas Company
Subject	Downtown Traffic and Safety Study
Project Number	23025504

This memo serves to provide a written response to the “Requests for CT Consultants” from the Village Safety Committee dated November 27, 2023. While several topics were discussed at Safety Committee meetings over the past year, this memo is intended to comprehensively address all topics contained in the ‘Requests’. Costs were developed for various solutions and a report is provided that summarizes funding options.

Through the course of this study, the downtown traffic computer model was modernized for use in analysis of current conditions for use in comparing to modelled changes in conditions. Many of the study items involve studying impacts on the flow of traffic. This was done by considering the Level of Service (LOS). LOS is a term used to describe the operating conditions of a roadway by calculating time of delay in seconds per vehicle (sec/veh) based on factors such as speed, travel time, and delay. This term is used to describe traffic conditions in several proposed scenarios and compare them to the existing conditions. The table below depicts the different levels of LOS and the associated traffic flow delay and conditions. LOS refers to the ease of vehicular travel only and not pedestrian travel. For the purposes of this report, the LOS provided is in terms of the entire intersection.

Level of Service Criteria for Signalized Intersections		
Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
A	A ≤10	Free Flow
B	B >10 - 20	Stable Flow (slight delays)
C	C >20 - 35	Stable flow (acceptable delays)
D	D >35 - 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	E >55 - 80	Unstable flow (intolerable delay)
F	F >80	Forced flow (jammed)

Traffic and pedestrian control options, geometry, timing, etc. are dictated by the latest versions of the Federal Manual on Uniform Traffic Control Devices (MUTCD) and the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) and are referenced thusly.

1. Pedestrian Scramble

We frequently hear about near-misses between pedestrians in a crosswalk and drivers turning left or right through the crosswalk that do not yield the right-of-way as required. One way to eliminate these situations would be to implement a Pedestrian Scramble/Barnes Dance period where all vehicular traffic is stopped, and pedestrians are free to cross the intersection in any direction. We would like to see the modeling results for instituting a Pedestrian Scramble at each of the signalized downtown intersections (Franklin and Washington, North Main and East Washington, North Main and Bell, and North Main and Orange).

- What is the predicted impact to vehicular traffic?
- How is the predicted impact affected by the length of the pedestrian-only interval?

In general, the traffic LOS decreases, and delay increases at all intersections with the implementation of the pedestrian scramble. It is assumed for the purposes of this model that the pedestrian push button is pushed 31 times per hour (31 is equal to the pedestrian button being pushed for every 115 second cycle length during the peak hour). The existing condition shows the pedestrian push button used 37 times per hour (37 is equal to the pedestrian button being pushed for every 95-second cycle length during the peak hour) in the north-south direction and east-west direction. The cycle length of a traffic signal is a complete sequence of signal phases and the time it takes a traffic signal to display this complete sequence is known as the "cycle length". CYCLE = 1 COMPLETE LOOP.

Take Bell Street at Main Street for an example. It has three phases, southbound left turn, northbound and southbound, and westbound. If the total time for each phase (including the yellow and all red time) lasts for 30 seconds, then the cycle length for this signal is 90 seconds. The cycle length for the PEDESTRIAN SCRAMBLE scenario is 115 seconds since the exclusive PEDESTRIAN SCRAMBLE phase is in addition to the three vehicle phases. The CURRENT PROGRAMMING, PROTECTED ONLY LEFT and NO RIGHT TURN ON RED scenarios have a 95 second cycle length.

TRAFFIC SIGNAL LEVEL OF SERVICE (LOS) FOR PEDESTRIAN SCRAMBLE

		CURRENT PROGRAMMING	DELAY (SEC)	PEDESTRIAN SCRAMBLE	DELAY (SEC)	CHANGE (SEC)	
		INTERSECTION					
P A M K	H E A U R	Main Street at Orange Street	LOS B	17.1	LOS C	26.7	9.6
		Main Street at Bell Street	LOS B	10.1	LOS B	14.1	4
		Main Street at Washington Street	LOS C	24.0	LOS D	41.7	17.7
		Franklin Street at Washington Street	LOS B	15.1	LOS C	23.0	7.9
		Maple Street at Franklin Street	LOS A	6.6	LOS B	10.5	3.9
N O M K	P E A U R	Main Street at Orange Street	LOS B	14.6	LOS C	24.1	9.5
		Main Street at Bell Street	LOS B	12.7	LOS C	24.6	11.9
		Main Street at Washington Street	LOS C	22.1	LOS D	38.8	16.7
		Franklin Street at Washington Street	LOS B	13.2	LOS C	32.1	18.9
		Maple Street at Franklin Street	LOS B	11.6	LOS B	15.3	3.7
P E M K	H E A U R	Main Street at Orange Street	LOS B	15.3	LOS C	21.6	6.3
		Main Street at Bell Street	LOS B	12.1	LOS C	22.5	10.4
		Main Street at Washington Street	LOS C	28.8	LOS D	43.0	14.2
		Franklin Street at Washington Street	LOS B	14.3	LOS C	30.8	16.5
		Maple Street at Franklin Street	LOS B	11.7	LOS B	15.3	3.6

2. “Protected-Only” Left-Turn Phasing

An alternative to Pedestrian Scramble that would prevent vehicular traffic from entering the crosswalk when pedestrians have the right-of-way is “Protected-Only’ Left-Turn phasing, when left turns are allowed only on a green left arrow signal. We would like to see modeling results for a “Protected-Only” Left-Turn phasing at all downtown signalized intersections.

- Can this be made more functional by increasing the duration of the left turn arrow to clear the lanes?
- Many of the cars in these intersections are exclusively turning. How can we address that and still provide an exclusive protected pedestrian interval? (We already have an LPI.)

The timing for the left turn phases (as with all phases) is determined by the number of vehicles in the lane. This is balanced with all the vehicles in the other lanes to move traffic through the intersection as efficiently as possible. If it is desired to completely clear the left turn lanes of all vehicles during every cycle, then the through traffic in the other directions will suffer. **Cycle lengths would also greatly increase if the PROTECTED-ONLY LEFT-TURN and PEDESTRIAN SCRAMBLE phasing were combined.** The PROTECTED-ONLY LEFT-TURN phasing results shown below used a cycle length of 95 seconds, which was derived from the volume of traffic at the Franklin Street and Main Street intersections throughout the downtown area.

As an example, if the PROTECTED-ONLY LEFT-TURN and PEDESTRIAN SCRAMBLE phasing were combined at the intersection of Main Street and Orange Street for the Noon Peak Hour, the 95 second cycle length, 31.8 seconds of delay and LOS C status of operation for PROTECTED-ONLY LEFT-TURN phasing would increase to a 120 second cycle length, 53.0 seconds of delay and LOS D status of operation. A 120 second cycle length is normally used at major intersections that have a minimum of two lanes in each direction plus an exclusive left turn lane, similar to the Aurora Road at Solon Road intersection.

TRAFFIC SIGNAL LEVEL OF SERVICE (LOS) FOR PROTECTED ONLY LEFT TURN

		CURRENT PROGRAMMING	DELAY (SEC)	PROTECTED ONLY LEFT TURN	DELAY (SEC)	CHANGE (SEC)
INTERSECTION						
P A M K R	Main Street at Orange Street	LOS B	17.1	LOS E	59.2	42.1
	Main Street at Bell Street	LOS B	10.1	LOS B	16.0	5.9
	Main Street at Washington Street	LOS C	24.0	LOS D	40.8	16.8
	Franklin Street at Washington Street	LOS B	15.1	LOS D	44.9	29.8
	Maple Street at Franklin Street	LOS A	6.6	LOS A	6.6	0.0
N O O N K R	Main Street at Orange Street	LOS B	14.6	LOS C	31.8	17.2
	Main Street at Bell Street	LOS B	12.7	LOS B	16.2	3.5
	Main Street at Washington Street	LOS C	22.1	LOS D	38.3	16.2
	Franklin Street at Washington Street	LOS B	13.2	LOS C	28.0	14.8
	Maple Street at Franklin Street	LOS B	11.6	LOS B	11.6	0.0
P P M K R	Main Street at Orange Street	LOS B	15.3	LOS D	37.5	22.2
	Main Street at Bell Street	LOS B	12.1	LOS B	16.3	4.2
	Main Street at Washington Street	LOS C	28.8	LOS E	72.9	44.1
	Franklin Street at Washington Street	LOS B	14.3	LOS C	28.2	13.9
	Maple Street at Franklin Street	LOS B	11.7	LOS B	11.7	0.0

*Maple Street at Franklin Street does not have a left turn lane or left turn signal

3. Right-on-Red Prohibited

Similarly, we can prevent vehicular traffic from entering the crosswalk when pedestrians have the right-of-way by prohibiting right turns on red, as currently found at the intersection of Bell and Main Streets. We would like to see modeling results for prohibiting Right-on-Red at all other downtown signalized intersections.

- What is the predicted impact to vehicular traffic?

*Prohibiting right turns on red at any intersection will increase delays and reduce the LOS at the intersection. Some of the reasons for prohibiting a right turn on red at an intersection are inadequate sight distance to safely make the turn, high pedestrian volumes/accidents and intersections within school zones. It can be seen from the intersection “NO RIGHT TURN ON RED” LOS chart the delay increases from a maximum of 11.6 seconds at Main Street and Orange Street to a minimum of 1.8 seconds at Maple and Franklin Street. **This increase in delay is small when compared to the increase in safety.***

TRAFFIC SIGNAL LEVEL OF SERVICE (LOS) FOR NO RIGHT TURN ON RED

		CURRENT PROGRAMMING	DELAY (SEC)	NO RIGHT TURN ON RED	DELAY (SEC)	CHANGE (SEC)
INTERSECTION						
P H A E O M A U K R	Main Street at Orange Street	LOS B	17.1	LOS C	22.6	5.5
	Main Street at Bell Street	LOS B	10.1	LOS B	13.0	2.9
	Main Street at Washington Street	LOS C	24.0	LOS C	28.8	4.8
	Franklin Street at Washington Street	LOS B	15.1	LOS C	20.2	5.1
	Maple Street at Franklin Street	LOS A	6.6	LOS A	10.0	3.4
N P H O E O O A U N K R	Main Street at Orange Street	LOS B	14.6	LOS C	26.2	11.6
	Main Street at Bell Street	LOS B	12.7	LOS B	17.1	4.4
	Main Street at Washington Street	LOS C	22.1	LOS C	29.0	6.9
	Franklin Street at Washington Street	LOS B	13.2	LOS B	18.6	5.4
	Maple Street at Franklin Street	LOS B	11.6	LOS B	13.5	1.9
P H P E O M A U K R	Main Street at Orange Street	LOS B	15.3	LOS C	26.9	11.6
	Main Street at Bell Street	LOS B	12.1	LOS B	18.4	6.3
	Main Street at Washington Street	LOS C	28.8	LOS D	53.2	24.4
	Franklin Street at Washington Street	LOS B	14.3	LOS C	24.2	9.9
	Maple Street at Franklin Street	LOS B	11.7	LOS B	13.5	1.8

4. Flashing Yellow Arrow

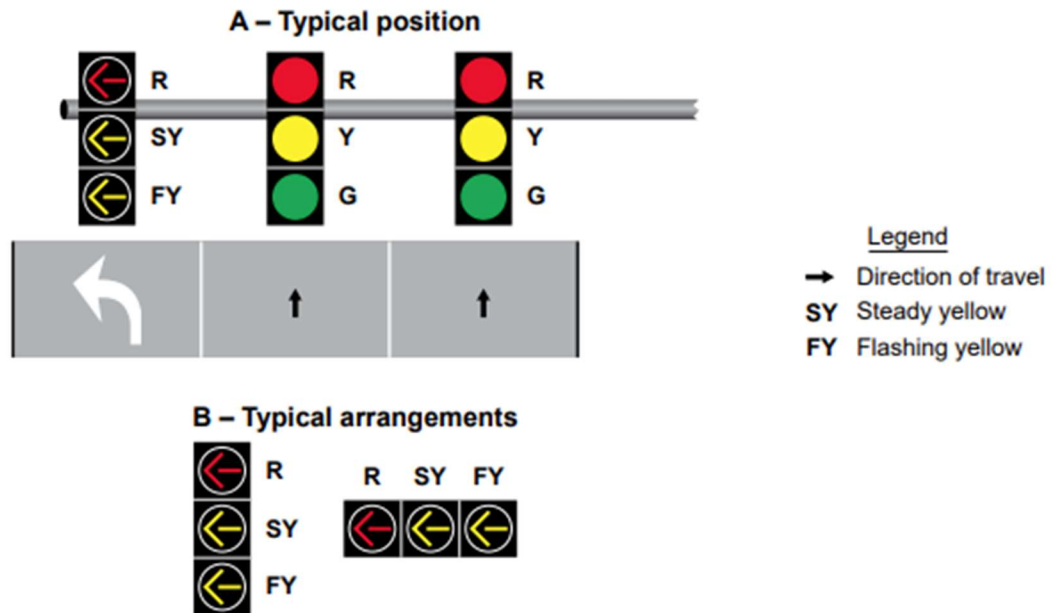
If we continue to allow “Permissive-Only” Left-Turn phasing and Right-Turns-on-Red, we could make it clearer to drivers that they must yield to pedestrians in the crosswalk by implementing a Flashing Yellow Arrow signal.

- What would it cost to update signaling equipment at all downtown intersections to support a flashing yellow arrow?

As can be seen below in Figure 4F-2 “Typical Position and Arrangements of Separate Signal Faces with Flashing Yellow Arrow for Permissive Only Mode Left Turns” from the MUTCD, the position of the FYA signal head is to be directly centered on the left turn lane. Most of the decorative mast arms in the downtown area as well as the signal heads would require replacement.

The estimated cost of replacing the mast arms, signal heads and updating the phasing to operate with flashing yellow arrow left turn phasing, at the four intersections, is \$300,000 to \$350,000 depending on the ability to reuse the existing foundations and wiring.

Figure 4F-2. Typical Position and Arrangements of Separate Signal Faces with Flashing Yellow Arrow for Permissive Only Mode Left Turns



5. Increasing Visibility

We would like to see recommendations for increasing visibility and pedestrian safety at each of the downtown crosswalks, particularly those that are mid-block (North Main at River Street, 17 North Franklin, and 20 North Main).

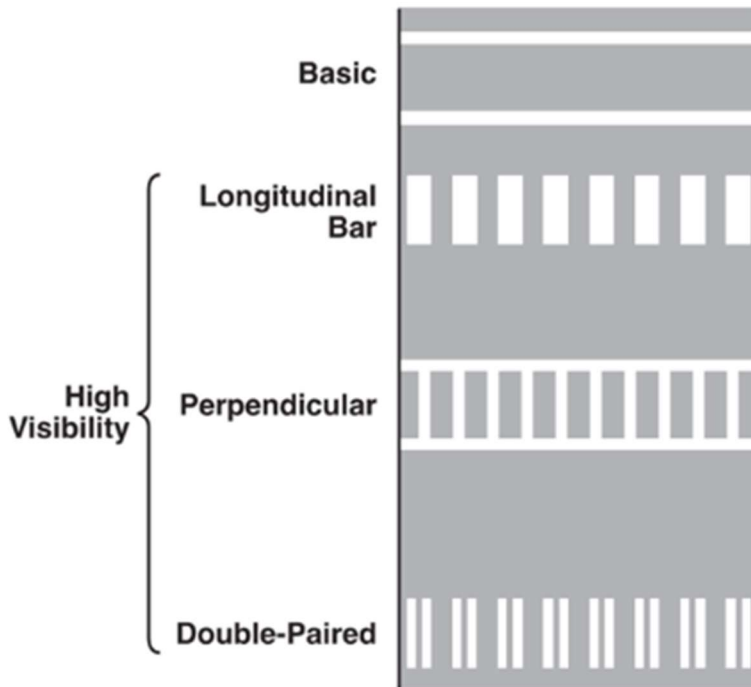
- **Daylighting in advance of a crosswalk makes pedestrians more visible to motorists, and vehicles more visible to pedestrians. In which, if any, crosswalks should the village consider reconfiguring or removing adjacent parking spaces to increase viewing distance?**

Design standards typically require a 20' clear zone from intersection crosswalks and on each side of midblock crosswalks especially in the direction of travel. This would require the elimination of parking spaces within the 20' clear zone. Standards recommend yield bars in advance of midblock crosswalks along with optional sign R1-5a signs for each stop line. All W11-2 signs and W16-7P plaques should be adjacent to the crosswalks as shown in the Federal and Ohio Manual of Traffic Control Devices. See below for sign images.

Additionally, the in-street "Yield for Pedestrian in Crosswalk" signs (R1-6) as shown below are known to be effective. All signs are recommended to utilize Type H sign sheeting with the W11-2 and W16-7P signs using fluorescent yellow green (FYG) Type H sheeting.



In addition to the above recommendations, consider updating crosswalks pavement markings to a ladder style pavement marking as shown below; ODOT considers this style as highly visible. At midblock crosswalks, the visibility would be improved by painting the concrete retainer curbs with high visibility white markings.



For enhanced safety, the Village could illuminate all midblock crosswalks as shown below on page 13 of the Federal Highway Administration's publication FHWA-HRT-08-053:

Note that for roadways that have traffic traveling in both directions, particularly those without a center median, two luminaires are required, located on either side of the road and placed prior to the crosswalk from the drivers' perspective. This is also shown in [figure 12](#).

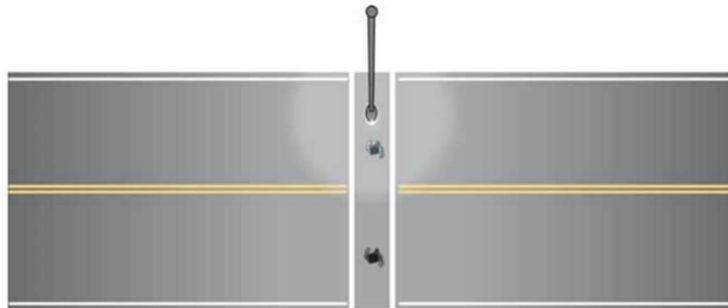


Figure 11. Drawing. Traditional midblock crosswalk lighting layout.

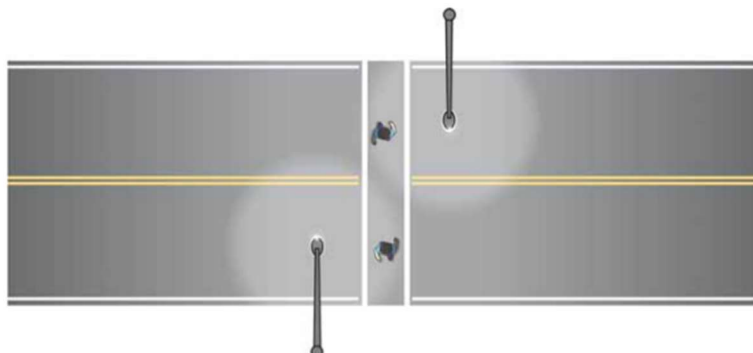


Figure 12. Drawing. New design for midblock crosswalk lighting layout.

Further visibility options for discussion include raised crosswalks at the midblock crosswalk on North Franklin Street, midblock crosswalk on North Main Street, all crosswalks for the Bell Street at Main Street intersection and the crosswalk for River Street at North Main Street. A raised crosswalk is extremely helpful for greater driver awareness and would enhance pedestrian safety at any crosswalk without a traffic signal. Although, raised crosswalk tables have a significant impact on through traffic and are rarely used on public roads.



- **Delivery vehicles frequently park in the prohibited zones adjacent to crosswalks or in the crosswalks themselves, blocking drivers' view of pedestrians entering the crosswalk (and vice-versa) or blocking pedestrian access entirely. (See photos below). How can we prevent this from happening without relying on entirely on police enforcement? Should we consider adding one or more loading zones to serve the Central Shopping District?**

Yes, Plaza Drive could be signed as a loading zone for the hours 7:00 AM to 5:00 PM on Monday through Friday with parking allowed after 5:00 PM and on weekends and holidays. Enforcement would still be required.

- **Curb extension can increase pedestrian safety at crosswalks by narrowing the roadway, increasing visibility and shortening the crossing distance. In which, if any, crosswalks do you recommend adding curb extensions?**

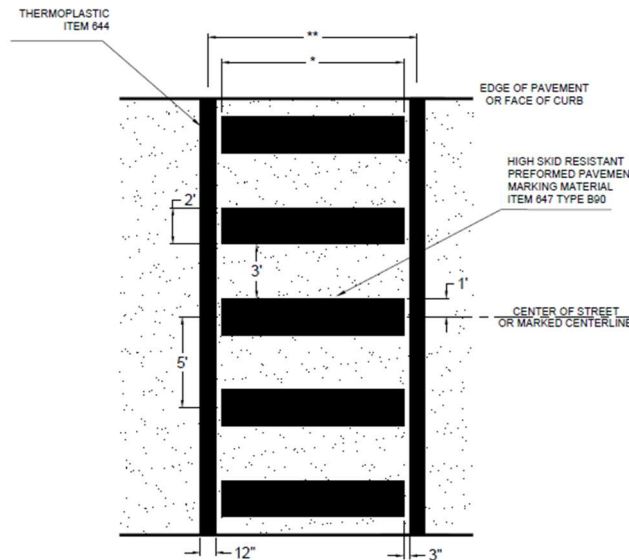
Curb extensions (bump outs) have been successfully used to improve visibility at crosswalks where geometry is conducive. Bumpouts could be constructed at the midblock crosswalks on either side of the Triangle as well as on the east side of the River Street midblock crosswalk. See included Curb Extension Plans for more information.

- **Crosswalk striping and other street markings seem to fade quickly. Are there more durable materials or methods available for marking crosswalks? What are the costs associated with other materials or methods?**

Consider high visibility markings as designated by ODOT and the OMUTCD. Adding reflective glass beads (Visibead, Visi-Ultra or Visimax) to all of the crosswalk pavement markings will increase visibility of the crosswalk and create a skid resistant surface. Also, installing crosswalks as shown below ensures a longer life for the pavement markings since the 24-inch ladder steps are placed to avoid the tire tracks vehicles. There are several types of pavement markings that increase with durability over the traditional usage of traffic pavement marking paint. Prices can range greatly depending on the amount of additional reflective glass beads added to the mixture.

	Paint	Polyester	Thermoplastic	Epoxy
Advantages	Cheapest option	More durable than paint	Brightest color, durability	Most durable
Disadvantages	Shortest life span	Cost	Cost	Dull color, cost
Life Cycle	0-2 years	2-3 years	3-5 years	3-5 years
Total Cost to Re-Paint Downtown Crosswalks	\$7,000	\$10,000	\$15,000	\$15,000

Whichever pavement marking material is used, it is recommended that they be installed in April or May at the latest to give time for the edges to be worn down by vehicular traffic. This will reduce the likelihood of snowplows catching the edge and damaging the pavement marking.



- The National Association of City Transportation Officials recommends stripping all mid-block crosswalks, regardless of the paving pattern or material. Our mid-block crosswalks are brick and not striped. Do you recommend striping them?

Traffic and safety regulatory agencies recommend high visibility striping types at pedestrian crossings. **Additional yield bars prior to the crosswalk** would also increase driver awareness and visibility of the crosswalk.

- Stop lines at mid-block crossings can increase the likelihood that a person crossing the street is visible to the driver in the second lane when the driver in the first lane is stopped. Our mid-block crosswalks currently lack stop lines. Do you recommend adding them?

Yes, we should consider installing yield bars 20' in advance of the crosswalks. If visible, we could also consider adding R1-5a signs for each stop line.

- **The crosswalk at North Main and Cottage is not very visible to traveling north or south on North Main Street. Can you provide a recommendation to improve the visibility of that crosswalk?**

The OMUTCD recommends that a 20' clear zone on each side of every crosswalk. At the North Main Street and Cottage Street crosswalk. It could be possible to adjust the curbside parking to achieve a 20' clear zone. Similar to the midblock crosswalks [uncontrolled crosswalk], yield bar pavement markings are recommended to increase visibility.

Signage options are the same as discussed in the midblock crosswalk narrative.

6. In-Ground Crosswalk Lighting

We would like to know if in-ground lighting systems similar to what's used on airstrips and in other ground applications can be used for mid-block crosswalks in cold climates. These are popular suggestions, but we are told that they don't work well with plows and cold environments. Our police force also endorses this approach, if viable.

- **Can you clarify this for us, and tell us if we should continue to entertain this option?**

The City of Montgomery, OH (suburb of Cincinnati, OH) has removed the two in-ground lighted crosswalks due to constant maintenance issues, and the City of Murphy, TX (suburb of Dallas, TX) has abandoned, but not yet removed two in-ground lighted crosswalks due to constant maintenance issues. The City of Cleveland, OH has also stopped repairing the in-ground sidewalk lights that illuminated the entrance to the Erie Street Cemetery on East 9th Street across the street from Progressive Field. While the "Crosswalk Warning In Pavement Light" is still being manufactured {Crosswalk Warning Lights - Traffic Safety Corp. (xwalk.com)}, their use is not recommended.

Below is a crosswalk lighting system called the SafeWalk® Crosswalk Illuminator that is a possible solution if other methods of crosswalk illumination methods are not used. This system would be used in conjunction with a Rapid Rectangular Flashing Beacon (RRFB). These would cost approximately \$20,000-\$40,000 per crosswalk depending on the system selected.



Key features include:

- Activates concurrently with LED-enhanced warning alerts
- Only activates at night, extending battery life and increasing autonomy
- Fits on most intelligent warning system (IWS) poles
- Allows for precise light focus at most crossings
- Built to withstand harsh weather due to rugged enclosure

The SafeWalk® Crosswalk Illuminator is now available everywhere.

7. Crosswalk Signal Timing

At some corners, there is not enough “dead time” between the end of the countdown flashing (convert to solid Don’t Walk) and the start of counter traffic for crosswalks to clear traffic, especially with elderly and small children. The countdown periods vary from 20 seconds at one corner (Orange and Main) to 12 seconds and 15 seconds at most others. Without changing the traffic light cycle time, adjusting three periods of the sequence (Walk, Countdown, “Deadtime” until Counter Traffic enabled) would improve safety.

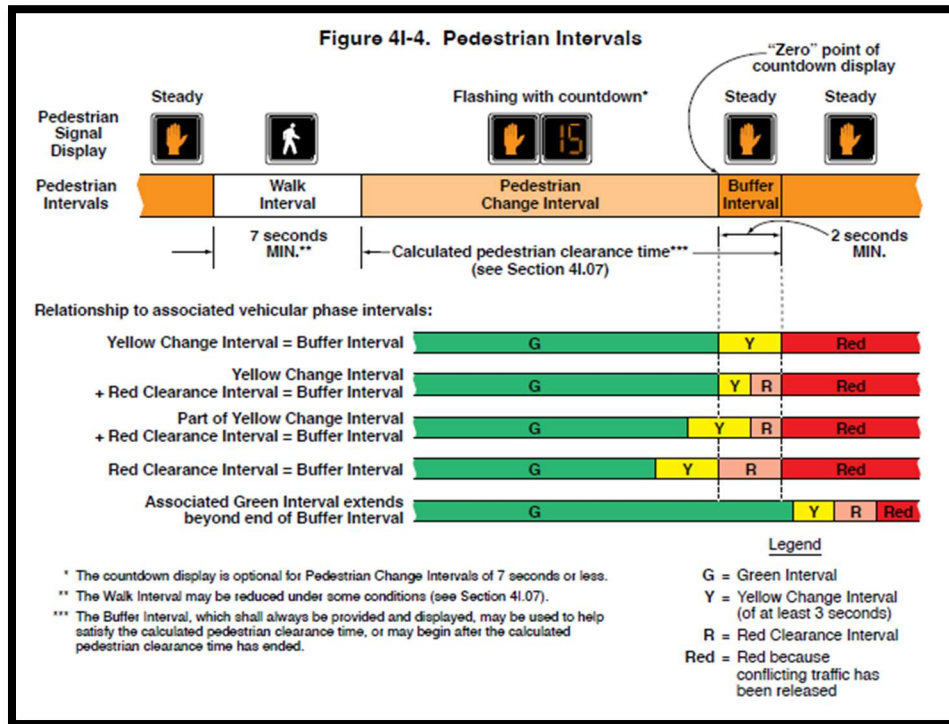
Countdowns are too long. Why is more than 5 seconds needed for the countdown between Walk and Don’t Walk?

The WALK and FLASHING DON’T WALK time are determined by following applicable MUTCD design standards. The informational sign below describes that pedestrians should not begin crossing after the FLASHING DON’T WALK indication begins. The timing of the FDW is based on the design walking speed of 3-feet per second to cross from curb to curb. For Main Street it takes approximately 19 seconds to cross, or 16 seconds if 3.5-feet per second is used to accommodate elderly pedestrians. Installing R10-3e (see below) signs at the push button locations may help pedestrian users understand how the system is intended to function.



R10-3e

Figure 41-4 from the MUTCD graphically depicts countdown and buffer intervals. The current interval at North Main Street and Orange Street is the Yellow Change Interval. We can investigate whether more buffer time can be achieved by reducing the WALK phase.



8. Traffic Signal Coordination

We have observed issues with the timing and coordination of crosswalk and traffic signals. It is our understanding that it has been many years since the entire system was configured, and many piecemeal adjustments to individual intersections have since been made.

We would like an estimate of the cost to have a comprehensive evaluation of and update to the downtown signal programming, and recommendations for specialized consultants who have experience with traffic signal programming in historic downtowns like ours.

In June of 2024, CT Consultants programmed the following traffic signals for vehicle progression:

- Main Street at Orange Street
- Main Street at Bell Street
- Main Street at Washington Street
- Franklin Street at Washington Street
- Franklin Street at Maple Street

The traffic signal timing program was written to move traffic northbound and southbound throughout the AM, Noon and PM peak hours as well as the off-peak periods and weekends during the Main Street Bridge Reconstruction Project. **When the bridge project is complete, the timing plans will be revised to keep the traffic moving safely and efficiently for pedestrians, bicyclists and vehicles.** The progression has been periodically monitored since being implemented and updates have been made to the timing plans at the Franklin Street and Main Street intersection and the Main Street and Washington Street

intersection. **An upgrade of the traffic signal equipment would provide more options for signal timing plans and operation.**

9. Updated Signal Equipment

Many of our intersections have crosswalk activation buttons that are separated by several feet and positioned away from the direction of travel, making them counterintuitive and difficult to find. We also believe it has been many years since the crosswalk and traffic signal equipment was installed, and devices with greater capabilities and reliability are now available.

- Council would like an estimate of the cost to review and replace outdated equipment at our signalized downtown intersections, including more intuitive crosswalk button placement and power back-up options that can be integrated into our existing light poles.

The existing signal equipment is adequate to manually accept modern signal timing programs because controllers have been replaced since the initial installation in ~2006. Monitoring and operation of traffic signals requires on-site access to controller cabinets. The Triangle signals are the only 2 signals that operate in coordination.

*With installation of a centrally controlled signal system, the Village will have the capabilities to actively monitor the traffic signal system operation and confirm the traffic signals are functioning properly. A central controlled signal system will also provide **capabilities for establishing a traffic adaptive system which can dynamically adjust timings to optimize traffic flow based on actual field conditions.** High speed network communications, typically with fiber optic communication, is necessary to set up and operate a centrally controlled signal system. The high-speed network communications will also have capacity to stream live CCTV camera feeds to Village Hall, with “eyes on the road” which will aid dispatch and EMS crews to understand current road conditions to plan response routes accordingly to reduce response times. Village staff can utilize the live video feeds to troubleshoot issues and respond to complaints more efficiently. **The estimated cost of implementing a centrally controlled signal system with the four downtown signalized intersections is between \$750,000 and \$850,000.***

If CCTV capabilities are desired by the Village, the estimated cost for installation of CCTV cameras at the four downtown signalized intersections is estimated to be between \$225,000 and \$250,000.

Updated pedestrian crosswalk pedestal locations would cost approximately \$10,000 - \$25,000 per intersection. This cost would include items such as a decorative pedestrian pedestal in an ADA appropriate location, conduit connections to the traffic signal system, concrete sidewalk replacement, etc.

*Additional safety features that can be added to the signalized intersections are emergency vehicle preemption, which will provide priority to EMS staff along roadways by ensuring the traffic signal is green for the direction of an EMS vehicle responding to an emergency. **The estimated cost of implementing EMS preemption signal control at the four downtown signalized intersections is between \$100,000 and \$115,000.***

*A battery backup system (UPS) can be installed at each signalized intersection to provide uninterruptible power to the traffic signal during a power outage. UPS units will maintain continuous power to an intersection for a minimum of 4 hours and up to 8 hours during a power outage, which will free police and other EMS personnel to deal with other issues during an emergency. **The estimated cost of implementing a UPS at the four downtown signalized intersections is between \$36,000 and \$40,000.***

10. Miscellaneous

Council would be interested in any other novel solutions for increasing pedestrian safety at our downtown intersections.

There are numerous possible solutions, all ranging in complexity, cost, feasibility, impact, etc. Several considerations have been mentioned in the above responses. If desired, further discussions topics include road diets, lane closures, and others in a later report.

11. Traffic Counts

It would be useful to have accurate data about the amount and kind of traffic passing through Chagrin Falls (vehicular, pedestrian, or bicycle). What method or methods—manual counts (professional or volunteer-led), pneumatic tubes, or automated processes using cameras or GPS signals—do you recommend to achieve the best results? Which locations would be most effective for understanding traffic passing through downtown?

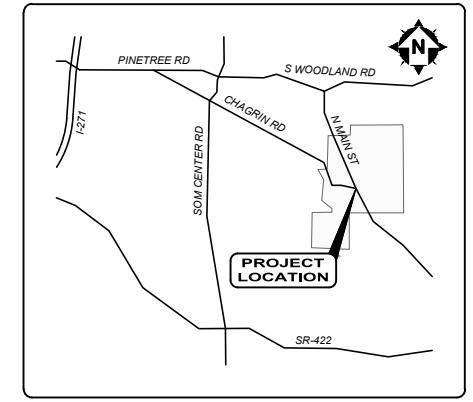
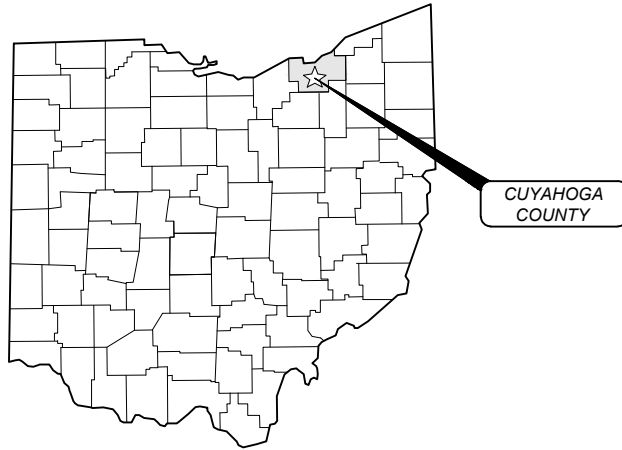
For this effort, “Streetlight data” geo-fencing counts were used to supplement prior camera supported counts. Traffic counts can be obtained using big data services to determine the origin and destination of traffic flow through the Village. If the central signal system is installed, the new detection installed as part of the system can also collect traffic volumes. Updated counts in some format would be used for any major change in signal timing.

12. Photos



- CURB EXTENSION PLANS FOR - DOWNTOWN PEDESTRIAN IMPROVEMENTS

PRELIMINARY VILLAGE OF CHAGRIN FALLS CUYAHOGA COUNTY, OHIO 2024



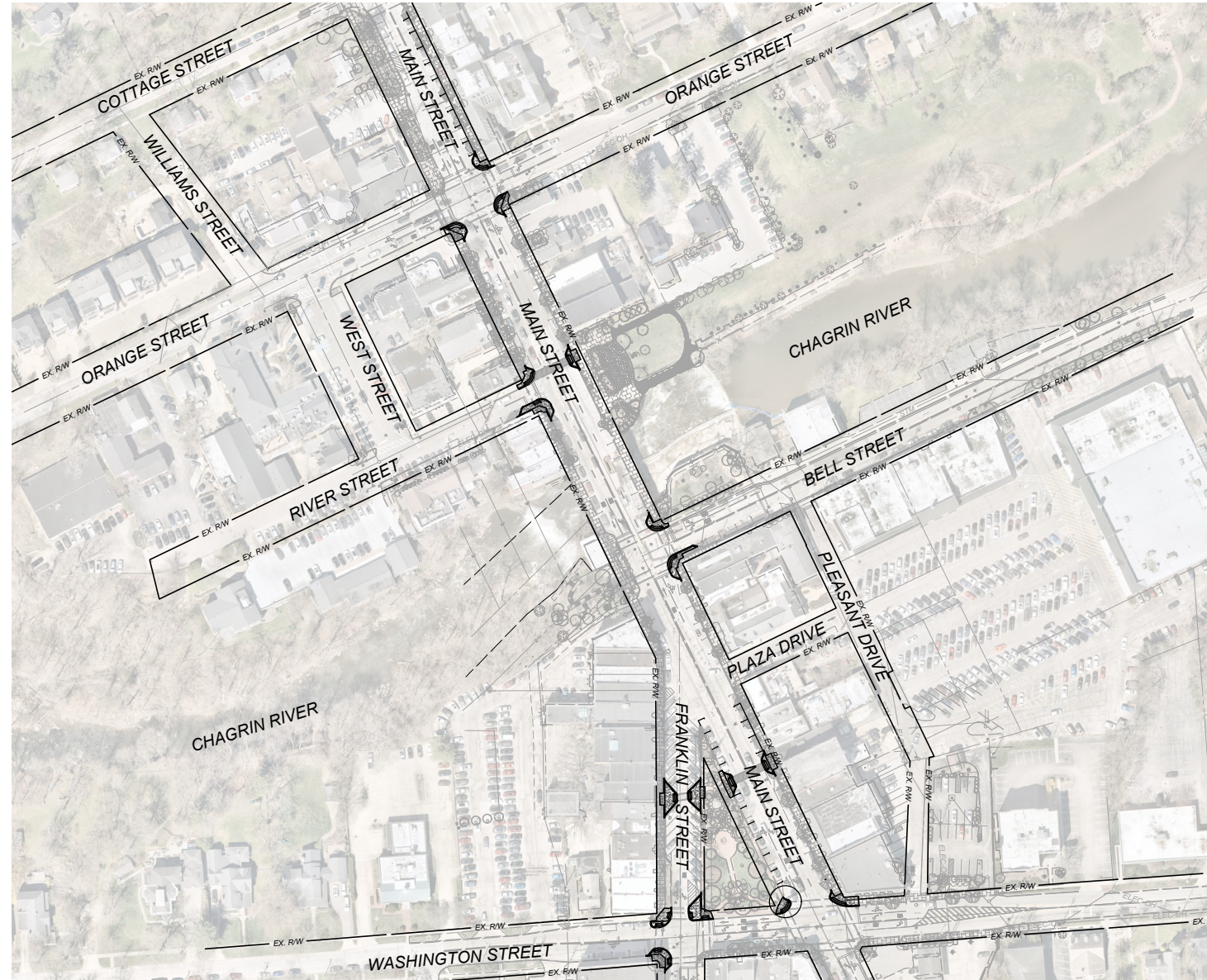
LOCATION MAP
NTS

LIST OF DRAWINGS	
1	COVER SHEET
2	NORTH SITE PLAN
3	SOUTH SITE PLAN
4	NORTH TURN ANALYSIS
5	SOUTH TURN ANALYSIS

REFERENCE DRAWINGS	
VILLAGE OF CHAGRIN FALLS - THE ILLUMINATING CO. WR#4071907	WO #11050675
ODOT-CHAGRIN FALLS SIGNALS - CT CONSULTANTS - 2002	PID #12639
CHAGRIN FALLS DOWNTOWN IMPROVEMENT PROJECT - E.G&G., INC - 2004	PID #75396
WEST WASHINGTON STREET IMPROVEMENTS - CT CONSULTANTS - 2002	PID #02119

UTILITY COMPANIES		
NOTE: UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED ON FIELD MARKINGS (BY OTHERS) AND AVAILABLE RECORDS, AND AS SUCH, SHOULD BE FIELD VERIFIED PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY - CALL BEFORE YOU DIG!		
SEWERS: VILLAGE OF CHAGRIN FALLS	WATER: VILLAGE OF CHAGRIN FALLS	LIGHTING: VILLAGE OF CHAGRIN FALLS
ELECTRIC: THE ILLUMINATING CO.	GAS: ENBRIDGE GAS OHIO	TELEPHONE: AT&T CHARTER COMMUNICATIONS (SPECTRUM/TIME WARNER)

PARKING STALL NOTES:
TOTAL EXISTING STALLS WITHIN 20' CLEAR ZONE = 5 STALLS
TOTAL STALLS LOST WITH PROPOSED STRIPING RELOCATION = 3 STALLS



MEMBERS OF COUNCIL
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GLENN ELLIOTT, UTILITIES SUPERINTENDENT
JOHN BROCKWAY, SUPERINTENDENT OF STREETS
TIM LANNON, PE, VILLAGE ENGINEER

ENGINEER
CT CONSULTANTS, INC. 8150 STERLING COURT MENTOR, OHIO 44060 (440) 951-9000 PHONE (440) 951-7487 FAX

LEGEND	
	PROPOSED ADA RAMP
	PROPOSED SIDEWALK
	PROPOSED TRENCH DRAIN
	FLOW DIRECTION
	PARKING WITHIN 20' CLEAR ZONE
	SMALL DELIVERY VEHICLE (SU-30)
	PASSENGER VEHICLE (P)



PRELIMINARY

NO	REVISION	DATE

VILLAGE OF CHAGRIN FALLS
PEDESTRIAN SAFETY IMPROVEMENTS PROJECT
CUYAHOGA COUNTY CHAGRIN FALLS, OHIO

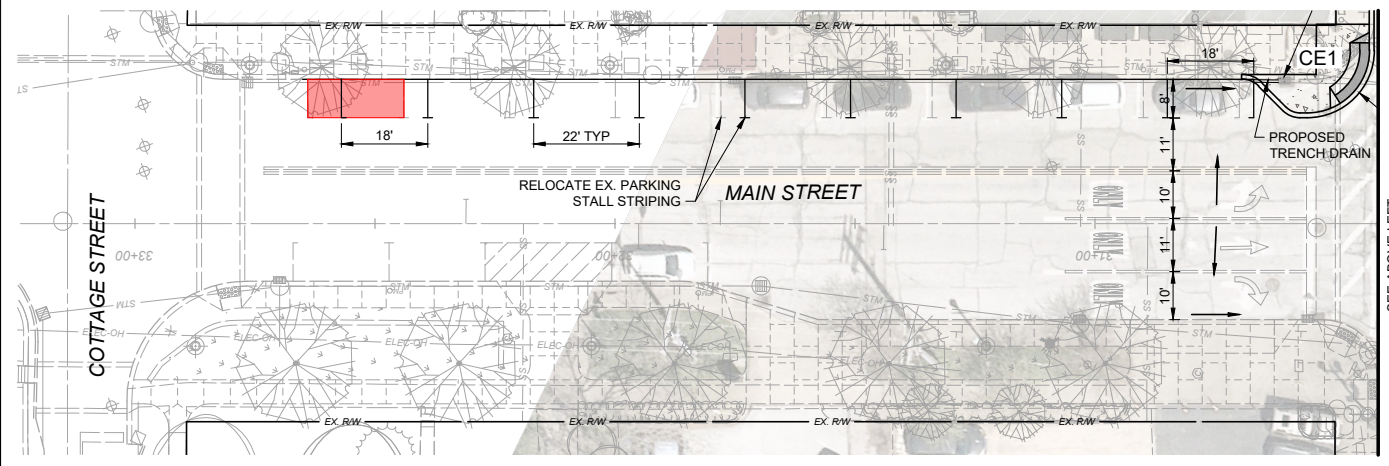
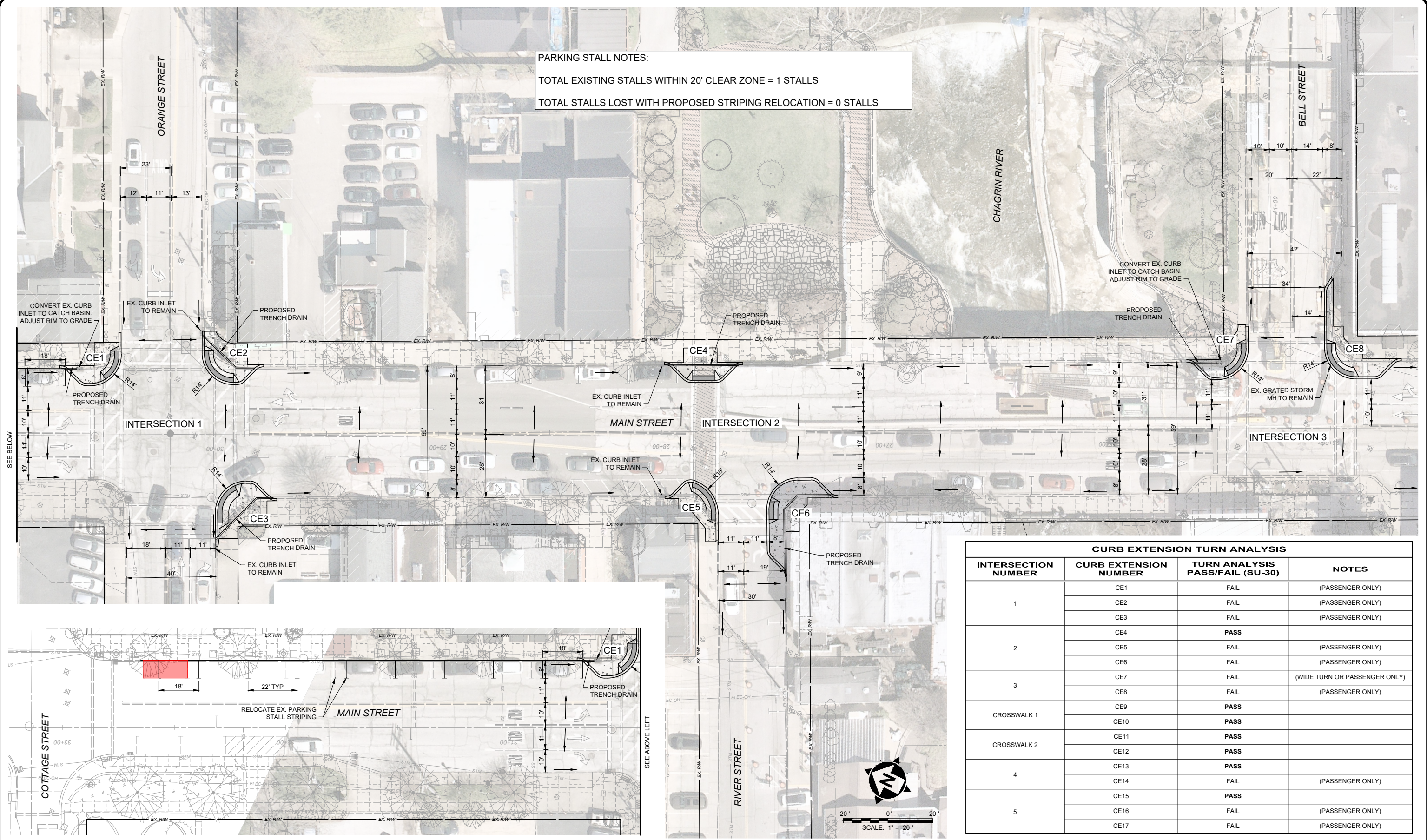
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ISSUE DATE:	11/07/24
SCALE:	AS NOTED
DESIGNED BY:	PTV
DRAWN BY:	PTV
CHECKED BY:	AAC

CURB EXTENSION PLANS COVER SHEET

PROJECT NO.	23025504
DISCIPLINE	CIVIL
SHEET NAME	COVER
SHEET	OF
1	5

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PARKING STALL NOTES:
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 TOTAL STALLS LOST WITH PROPOSED STRIPING RELOCATION = 0 STALLS



CURB EXTENSION TURN ANALYSIS			
INTERSECTION NUMBER	CURB EXTENSION NUMBER	TURN ANALYSIS PASS/FAIL (SU-30)	NOTES
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	CE2	FAIL	(PASSENGER ONLY)
	CE3	FAIL	(PASSENGER ONLY)
2	CE4	PASS	
	CE5	FAIL	(PASSENGER ONLY)
3	CE6	FAIL	(PASSENGER ONLY)
	CE7	FAIL	(WIDE TURN OR PASSENGER ONLY)
	CE8	FAIL	(PASSENGER ONLY)
CROSSWALK 1	CE9	PASS	
CROSSWALK 2	CE10	PASS	
	CE11	PASS	
4	CE12	PASS	
	CE13	PASS	
5	CE14	FAIL	(PASSENGER ONLY)
	CE15	PASS	
	CE16	FAIL	(PASSENGER ONLY)
	CE17	FAIL	(PASSENGER ONLY)

PRELIMINARY

consultants
engineers • architects • planners
A Verdantas Company

NO	REVISION	DATE

VILLAGE OF CHAGRIN FALLS
PEDESTRIAN SAFETY IMPROVEMENTS PROJECT
 CUYAHOGA COUNTY CHAGRIN FALLS, OHIO

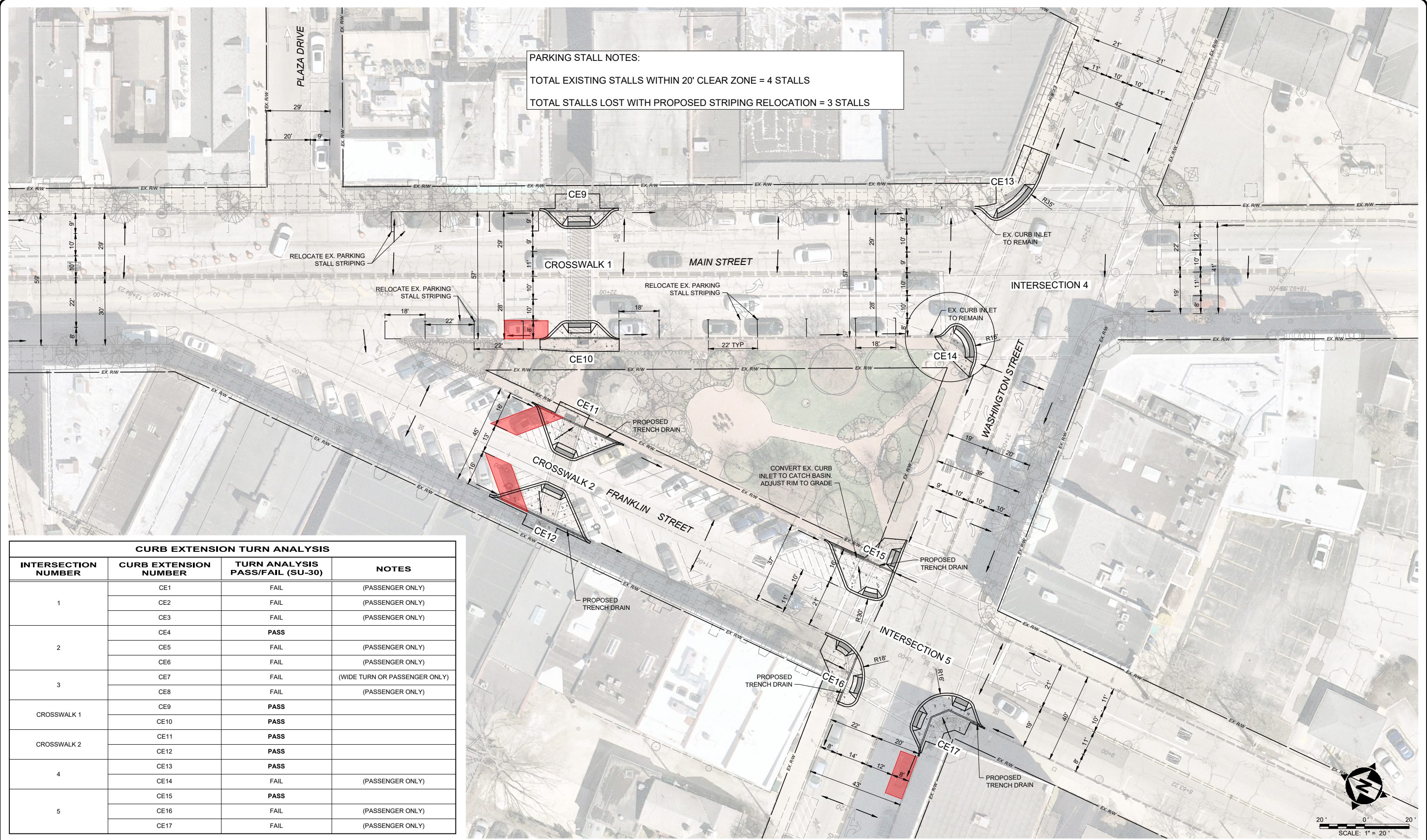
ISSUED FOR: 30% REVIEW
 ISSUE DATE: 11/07/24
 SCALE: AS NOTED
 DESIGNED BY: PTV
 DRAWN BY: PTV
 CHECKED BY: AAC

CURB EXTENSION PLANS
NORTH SITE PLAN

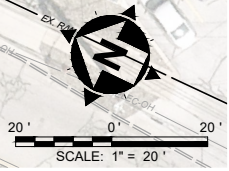
PROJECT NO. **23025504**
 DISCIPLINE **CIVIL**
 SHEET NAME **C-01**
 SHEET **2** OF **5**

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PARKING STALL NOTES:
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 TOTAL STALLS LOST WITH PROPOSED STRIPING RELOCATION = 3 STALLS



CURB EXTENSION TURN ANALYSIS			
INTERSECTION NUMBER	CURB EXTENSION NUMBER	TURN ANALYSIS PASS/FAIL (SU-30)	NOTES
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	CE2	FAIL	(PASSENGER ONLY)
	CE3	FAIL	(PASSENGER ONLY)
2	CE4	PASS	
	CE5	FAIL	(PASSENGER ONLY)
3	CE6	FAIL	(PASSENGER ONLY)
	CE7	FAIL	(WIDE TURN OR PASSENGER ONLY)
CROSSWALK 1	CE8	FAIL	(PASSENGER ONLY)
	CE9	PASS	
CROSSWALK 2	CE10	PASS	
	CE11	PASS	
4	CE12	PASS	
	CE13	PASS	
	CE14	FAIL	(PASSENGER ONLY)
5	CE15	PASS	
	CE16	FAIL	(PASSENGER ONLY)
	CE17	FAIL	(PASSENGER ONLY)



PRELIMINARY



NO	REVISION	DATE

VILLAGE OF CHAGRIN FALLS

PEDESTRIAN SAFETY IMPROVEMENTS PROJECT

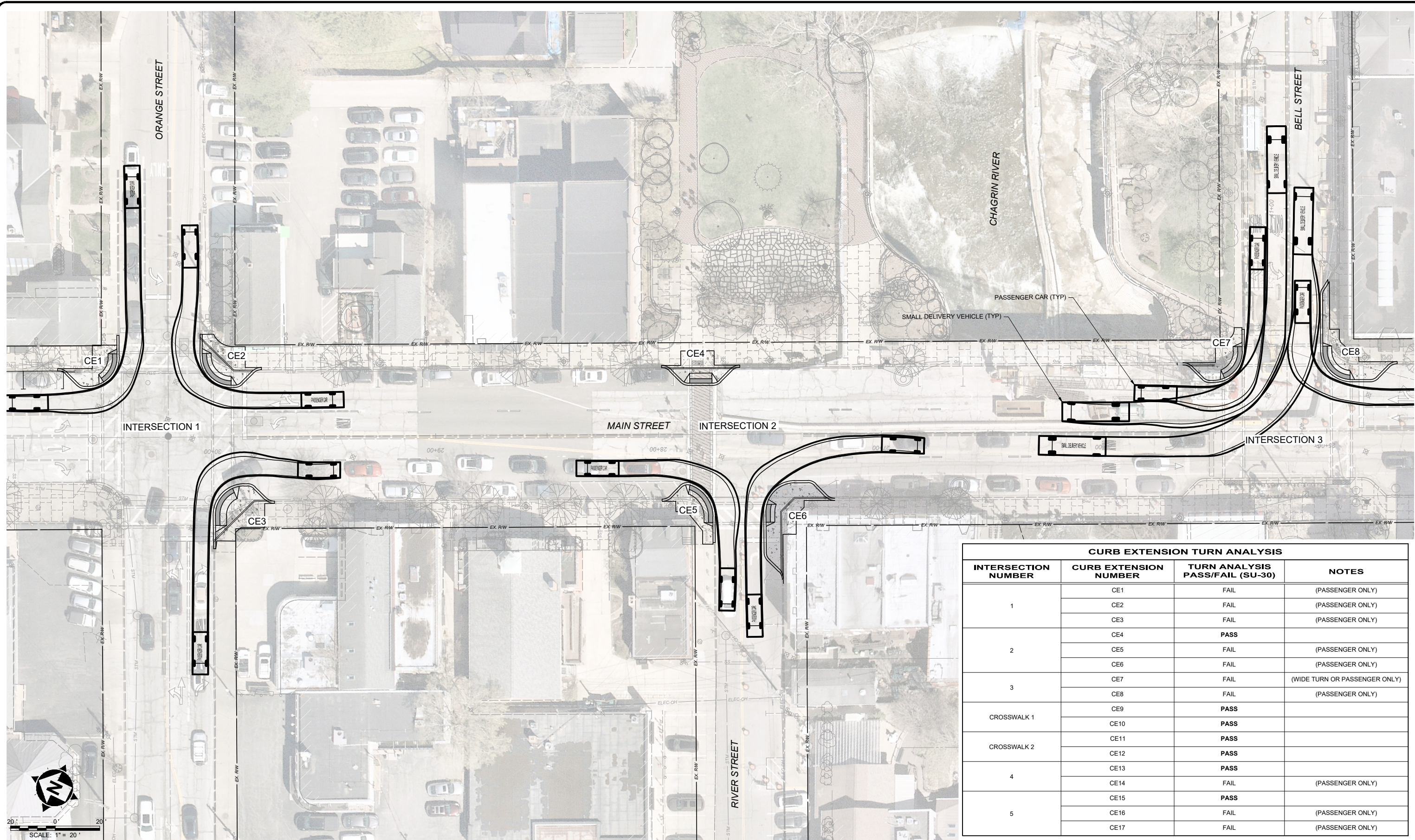
CUYAHOGA COUNTY CHAGRIN FALLS, OHIO

ISSUED FOR: 30% REVIEW
 ISSUE DATE: 11/07/24
 SCALE: AS NOTED
 DESIGNED BY: PTV
 DRAWN BY: PTV
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CURB EXTENSION PLANS SOUTH SITE PLAN

PROJECT NO.		23025504
DISCIPLINE		CIVIL
SHEET NAME		C-02
SHEET	OF	
3	5	

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CURB EXTENSION TURN ANALYSIS			
INTERSECTION NUMBER	CURB EXTENSION NUMBER	TURN ANALYSIS PASS/FAIL (SU-30)	NOTES
1	CE1	FAIL	(PASSENGER ONLY)
	CE2	FAIL	(PASSENGER ONLY)
	CE3	FAIL	(PASSENGER ONLY)
2	CE4	PASS	
	CE5	FAIL	(PASSENGER ONLY)
3	CE6	FAIL	(PASSENGER ONLY)
	CE7	FAIL	(WIDE TURN OR PASSENGER ONLY)
	CE8	FAIL	(PASSENGER ONLY)
CROSSWALK 1	CE9	PASS	
	CE10	PASS	
CROSSWALK 2	CE11	PASS	
	CE12	PASS	
4	CE13	PASS	
	CE14	FAIL	(PASSENGER ONLY)
	CE15	PASS	
5	CE16	FAIL	(PASSENGER ONLY)
	CE17	FAIL	(PASSENGER ONLY)

PRELIMINARY

NO	REVISION	DATE

VILLAGE OF CHAGRIN FALLS

PEDESTRIAN SAFETY IMPROVEMENTS PROJECT

CUYAHOGA COUNTY CHAGRIN FALLS, OHIO

ISSUED FOR: 30% REVIEW
 ISSUE DATE: 11/07/24
 SCALE: AS NOTED
 DESIGNED BY: PTV
 DRAWN BY: PTV
 CHECKED BY: AAC

CURB EXTENSION PLANS
NORTH TURN ANALYSIS

PROJECT NO. 23025504	
DISCIPLINE CIVIL	
SHEET NAME C-03	
SHEET 4	OF 5

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Memo

Date	November 11, 2024
To	Village of Chagrin Falls
From	CT Consultants, Inc. A Verdantas Company
Subject	DTSS - Funding Opportunities for Pedestrian Enhancements

Introduction

This memorandum will describe some of the possible funding opportunities for funding planning, design, and construction activities recommended in the Downtown Traffic and Safety Study. Eligibility for most grant funding series is determined by several factors:

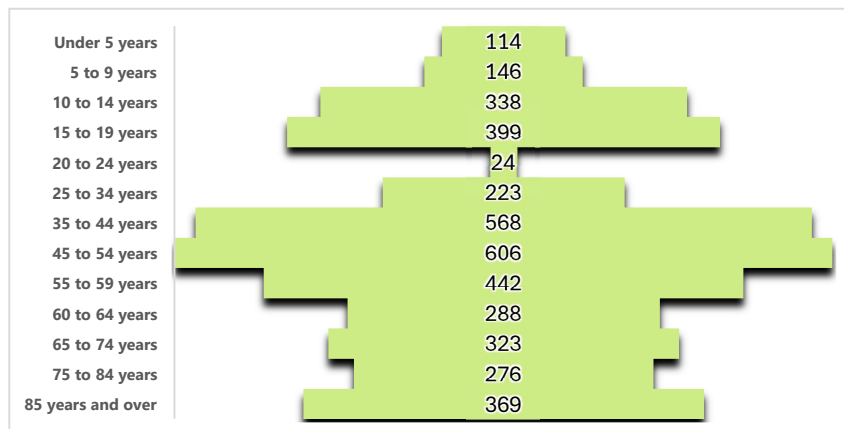
1. Community Wealth and Economic Indicators
2. Community Social and Equity Indicators
3. Community Health and Environmental Indicator
4. Community Safety Indicators

Specific grants may require a specific data tool for assessment. Below we have summarized the most common community indicators according to the most commonly used assessed tool. This has been done to create an overall image of eligibility and competitiveness. Below is a general summary of each of Chagrins Falls four general community indicators.

Community Profile

1. Population

The Village of Chagrin Falls had an estimated population of 4,116 in 2022 according to the U.S. Census Bureau¹. The population is divided 55/45 women and men, meaning there are more women than men in the village. Chagrin Falls is an older community, with a median age of 49.6 years. Using an Age Pyramid



(figure 1), we can see that Chagrin Falls is skewed heavily towards older and middle-aged residents and has a dearth of people aged 34 and younger. A population pyramid in this shape

¹ 2022 ACS 5-Year DP-05

implies the village will suffer significant demographic shift and potential population decline in the next decade, as there are less children being born and older residents die.

Income

Chagrin Falls has a median household income of \$99,821. This is higher than the U.S. median of \$74,580 in 2022². However, mean household income is \$171,398, substantial difference between the two. Because the mean is higher than the median, we consider the data skewed right (positively), meaning there are more people making less than the median that are being skewed by less people making significantly more money. This indicates income inequality.

Economists consider those paying 35% or more of their income on housing costs to be housing burdened. In Chagrin Falls, 15.5% of homeowners and 46.5% of renters are housing burdened. The number of renters in particular represents a strong indicator of income inequality. Those receiving Social Security benefits in Chagrin Falls makes up over a third (34.5%) of all residents. Further, 3% of residents were living below the poverty line.

Housing and Households

Of all households in Chagrin Falls, roughly a quarter (25.6%) have at least one person under 18, while about a third (35.1%) have at least one person 65 or older. This is a good indicator of demographic shift and overall aging of the community, as shown previously in figure 1. Further, 17.2% of those 65 and older live alone.

2. Equity

Disabled residents make up 11.8% of those living in Chagrin Falls. Disabilities can cover any ailment, from intellectual to physical. Often times, disabled persons have mobility or navigation issues that require ADA-compliant pedestrian facilities to help them move about the community.

Nearly 10% of residents in Chagrin Falls do not have access to broadband internet at home, leaving them without means to contact anything from disability services to transit services to food delivery. While most people have access to a vehicle, 6.9% of residents do not have access to a motor vehicle in their household.

3. Health and Environment

According to the U.S. DOT Equitable Transportation Community (ETC) Explorer, residents of Chagrin Falls are at increased risk of environment burden. 71% of residents were estimated to be at risk of exposure to harmful ozone levels, while 73% risked interaction with impaired surface water.

Table 1. Selected Health Metric Incidence Rates

Category	Chagrin Falls	Ohio
Binge Drinking	17.20%	17.18%
Taking Blood Pressure Meds	79.80%	75.99%
Cancer	9.60%	6.60%
High Cholesterol	34.00%	31.33%

Chagrin Falls registers a higher risk of certain health ailments in relation to the rest of Ohio. Table 1 shows categories in which residents of Chagrin Falls show increased prevalence or risk of disease or sickness.³

² 2022 is used to maintain consistency with 2022 U.S. Census data

³ Community Wellbeing: Social Determinants of Health Dashboard | Ohio Department of Health

4. Traffic Crash Data

Chagrin Falls averaged 70 crashes a year between 2014 and 2023, including a fatal crash and twelve serious injury crashes. This is a high number for a community of less than 5,000 people and covering only 2.1 square miles. When examining all crashes during that period, nearly one in ten occupants/drivers were injured or killed in some way (128 total injuries or fatalities).

Table 2. Top Five Crash Types

Crash Type	Fatal	Serious Injury	Minor Injury	Possible Injury	Property Damage Only	Total
Rear-End		1	6	18	131	156
Backing				1	110	111
Angle			3	13	81	97
Fixed Object		2	6	11	69	88
Sideswipe			2	2	93	87

Table 3. Crashes by Severity Involving Vulnerable Users

Crash Type	Fatal	Serious Injury	Minor Injury	Possible Injury	Property Damage Only	Total
Pedestrian	1	6	6	4		17
Bicycle			1	2	1	4
Elderly (65+)		3	11	21	173	208
Young (15-25)		3	10	15	205	233

The most prevalent crashes in Chagrin Falls are shown in Table 2. Rear-end crashes are far and away the most prevalent, and also result in the most injuries. Table 3 shows vulnerable users and injuries. Despite only 17 crashes involving pedestrians, those crashes accounted for the fatality in Chagrin Falls, as well as half of all serious injury crashes. Young and Elderly- involved crashes made up a majority of crashes with 233 and 208 respectively, for a total of 441 out of 704 crashes. Table 4 shows the dangerous driving actions and their results, with distracted driving being especially deadly and prevalent, while Table 5 shows the share of total people involved in crashes and their injury status.

Table 4. Dangerous Driving Behaviors

Crash Type	Fatal	Serious Injury	Minor Injury	Possible Injury	Property Damage Only	Total
Alcohol-Involved		3	1	4	19	27
Drug-Involved		1		1	2	4
Speeding		2	4	7	24	37
Distracted Driving	1	1	3	7	44	56

Table 5. Injured Persons

Injury Type	No.	Pct.	Injuries as a percent of all persons involved
Possible Injuries	78	60.9%	9.8%
Ambulatory Inj.	36	28.1%	
Incapacitating Inj.	14	10.9%	
Total injuries	128	-	
Fatalities	1	-	
Not Injured	1,175	-	

In summation, there are several items that should be noted for general eligibility.

- Status as a Village (population under 5,000).
- Income is higher than both the US and Ohio average. This will significantly impact competitiveness across most grant series.
- Equity, Health and Environmental Indicators, while far from perfect, are significantly better compared to many other northern Ohio communities. Again, this could impact competitiveness.
- Safety Indicators suggest that overall accident ratios, including 1 fatal pedestrian accident, are relatively high. This should be a focal point of emphasis in selecting an appropriate grant series.

The next section will explore the potential funding options specific to Chagrin Falls Downtown Safety Study and Pedestrian Enhancements.

Funding Opportunities

Below is list of funding opportunities that could pay for one or more elements of the Chagrin Falls Downtown Safety Study and Pedestrian Enhancements. It is generally understood that the emphasis is to move forward in the immediate future and long-term multi-year strategies are beyond the implementation window desired by the community. This list is not meant to be exhaustive, but a prioritized list of the opportunities based on competitive and timeliness to implementation. Additionally, new grant series and opportunities have been common the past several years, therefore it is imperative that we continue to monitor for new opportunities.

1. Ohio DOT Special Solicitation for Active Trans.

Ohio Department of Transportation recently announced this special funding opportunity. The cycle is currently open and the determined first round of consideration is January 2025. We would strongly encourage application in the first round as we believe this will be extremely popular. ODOT is offering a special solicitation for a variety of pedestrian or bicycle related projects, with an emphasis on projects that can be completed in the short term. Any political subdivision is eligible to apply, regardless of location inside or outside of an MPO. Eligible Project Types

- Non-infrastructures projects:
 - Education and promotion projects such as temporary demonstration projects
 - Data collection
 - Planning Activities (e.g., Safe Routes to School and Active Transportation Plans).
- Infrastructure projects that can be built quickly (i.e., are fully in the right of way), such as:
 - Sidewalk replacement or trail resurfacing
 - Pavement markings
 - Median islands or raised crosswalks
- Traditional infrastructure projects of statewide significance:
 - Projects that improve the Level of Traffic Stress of Ohio's State and US Bike Route System.
- Competitive Criteria Scoring is based on demonstrating:
 - The project will improve statewide goals

- There is a need for funding
- The ability to successfully implement the project
- Priority will be given to:
 - Non-infrastructure projects
 - Infrastructure projects that can begin construction by June 30, 2026.
 - Projects identified in a local plan
 - Projects in areas where there is high demand and high need for active transportation.
- For traditional infrastructure projects, priority will be given to projects that improve the Level of Traffic Stress (LTS) of Ohio's State and US Bike Route System.
- Most of this funding is available at 100%, with no local match required. However, municipalities with over 100,000 people are required to provide a 20% match only for infrastructure projects.

This new opportunity should be the Village's primary target for funding. It is uniquely suited to the Chagrin Falls Downtown Safety Study and Pedestrian Enhancements. Funding can include additional planning as well as design and construction dollars. Given the stated preference for non-construction projects – we recommend limiting this request to planning and design. Furthermore, direct communication with Ohio Department of Transportation suggests they will consider request before January and even possibly award prior to January. Nonetheless, our recommendation is that this grant series is the first and best opportunity for the Village to consider. For more details and to apply, please visit: [Pedestrian & Bicycle Special Solicitation | Ohio Department of Transportation](#)

2. NOACA – CMAG/STBG/TA/TLCI

NOACA receives approximately \$51 million annually in funds from the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the Ohio Department of Transportation (ODOT) to allocate to projects in its five counties. The NOACA Board of Directors determines which transportation improvement projects will receive federal funds in the NOACA region.

- Includes all federally funded projects and regionally significant, non-federally funded transportation projects to be implemented in NOACA's five counties over the next four fiscal years
- Budgets, prioritizes and schedules federal-aid highway, transit and transportation alternatives projects
- Assists the transportation community and the public track the use of state, local and federal transportation funds
- Accounts for the region's immediate transportation system expenditures
- Has a four-year time frame
- **Is updated every two years by NOACA (and is amended quarterly by the Board of Directors).**

2.1 NOACA – CMAG

CMAQ funds can only be used for projects that help reduce traffic congestion and improve air quality. They may be used for traffic signal upgrade projects, bus replacements, bike facilities, intelligent transportation system improvements, transit center and Park-N-Ride construction – and for conducting NOACA's Air Quality Program. NOACA is part of Ohio's Statewide Urban CMAQ Committee, which determines annual fund distribution for this program. Once projects are

recommended for CMAQ funding by the NOACA Board of Directors, final funding decisions are made by OSUCC. The CMAQ program provides 80 percent of total eligible project costs and the minimum local share is 20 percent, which must be provided from local, state, or other non-federal sources. Costs associated with a non-CMAQ funded phase are not considered as part of the local share.

2.2 NOACA – STBG

These funds are the most flexible and may be applied to road and bridge projects, transit projects, bikeways, pedestrian, safety, planning, and TLCI projects.

2.3 NOACA – Transportation Alternatives

These funds are used for pedestrian and bicycle facilities, safe routes for non-drivers, recreational trails, community improvement activities, environmental mitigation, and more

2.4 NOACA – TLCI

NOACA's Transportation for Livable Communities Initiative (TLCI) assists communities and public agencies with integrated transportation and land use planning to enhance community livability. TLCI supports NOACA's Regional Strategic Plan by focusing on:

- Developing transportation projects that offer more travel options through complete streets and context-sensitive solutions, increasing user safety and supporting public health.
- Supporting economic development through place-based transportation and land use recommendations, connecting these proposals with existing assets and investments.
- Ensuring that growth benefits all community members by integrating accessibility and environmental justice principles.
- Enhancing regional cohesion by fostering collaboration between regional and community partners.
- Providing safe and reliable transportation choices that improve quality of life.

The TLCI program has two components: planning and implementation.

1. **Planning Awards:** Fund planning studies that can lead to transportation system improvements and neighborhood support.
2. **Implementation Awards:** Help communities develop and install infrastructure from past livability studies. Minimum implementation requests are \$100,000, but smaller projects may be considered if they align with TLCI goals.

TLCI applications for 2025 are expected to follow the same timeline and guidelines as the 2024 program.

3. ODOT – Active Transportation Assistance Program

Since 2021, ODOT has offered Active Transportation Planning Assistance for planning activities. While it may not directly fit the Chagrin Falls Downtown Safety Study and Pedestrian Enhancements, it is worth considering for future phases or broader pedestrian and bicycle plan updates. The Chagrin Falls Region Alternative Transportation Plan was published in 2010.

Eligible Project Types: This competitive application supports local governments in developing standalone active transportation plans that align with Ohio's six Active Transportation goals outlined in Walk.Bike.Ohio:

- **Network Connectivity:** Promoting continuous bicycle and pedestrian facilities that connect people to destinations.
- **Safety:** Reducing bicyclist/pedestrian injuries and fatalities.
- **Equity:** Accommodating users of all ages, abilities, and incomes.
- **Network Utilization:** Increasing walking and biking usage.
- **Livability:** Improving quality of life for all Ohioans.
- **Preservation:** Maintaining critical existing infrastructure.

Applicants: Cities, villages, townships, and counties are eligible to apply, with the possibility of collaboration. Park Districts may collaborate but not be the sole applicant.

Requirements: A local lead must be identified, and a letter of support from all project team members is required. Applicants must dedicate staff time throughout the plan development process and perform all Local Project Sponsor roles. Selected local governments must participate in a project scoping call with ODOT and the consultant team within four weeks of the award. Applications for planning assistance are due by December 2, 2024.

4. Ohio State Infrastructure Bank (SIB) - Loan

The Ohio Department of Transportation operates a revolving loan program to finance transportation-related infrastructure repairs and improvements. Qualified applicants include any public entity, such as municipalities. The program supports projects eligible under Federal Title 23, including highway, transit, aviation, rail, and intermodal facilities. Loan collateral can include secure revenue streams like gasoline tax revenues, non-tax revenues, Tax Increment Financing district revenues, and license plate and registration fees.

Terms/Interest Rate:

- Up to 30-year loan term at 3% interest (based on the useful life of the asset).
- Interest deferral for the first 12 months.
- Closing costs may be financed into the loan balance.

Preferences and Evaluation:

- Preference is given to first-time borrowers.
- Applicants are evaluated based on credit risk.
- No more than 50% of the 12-month forecasted balances above reserved amounts will be available for any individual loan application.
- An applicant may submit multiple applications, but ODOT is only required to review one per State Fiscal Year (SFY).