MEMORANDUM

REGULAR CITY COUNCIL MEETING

May 1, 2023, at 7:00 PM

TO: City Council

FROM: Rich LaBombard, City Manager

SUBJECT: Water Street Workshop Follow Up

At the February 21, 2023, City Council workshop, attendees made up of City Council members, residents, the City Engineer, and City staff met to discuss possible solutions to resolve safety and speeding concerns on Water Street between Randolph Street and Wiley Road. Participants broke up into groups to compile lists of possible solutions to be explored. As discussed at the conclusion of the workshop, the ideas were ranked by City Council and the list was provided to the City Engineer to estimate the cost to implement the solutions for inclusion in the annual budget process.

The following information was provided by the City Engineer following their review of the information provided.

Discussion item.

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Memorandum

Date:	4/13/2023
To:	Rich LaBombard, City Manager
Community:	City of the Village of Douglas
From:	Lucas Timmer, P.E.
Project #:	2230344
Re:	Water Street Road Improvements

The City of the Village of Douglas hosted a workshop on February 21, 2023 to review options for traffic improvements for Water Street. This meeting was a follow-up to previous meetings, discussions, and reports about the traffic on Water Street in 2021 and 2022 (see October 26, 2021, Water Street Traffic Study report).

Property owners along Water Street and City Council have addressed concerns with vehicle speeds, large vehicle usage, and pedestrian safety. Following the workshop, Prein&Newhof was tasked to investigate options generated from City Council and the City Manager for future improvements along Water Street to address these issues.

Improvements to Traffic Signage

The current signage on site is shown in Figure 1 below. The existing signage used does follow Michigan Manual on Uniform Traffic Control Devices (MMUTCD) as the Reverse Turn (W1-3) signs and One Direction Large Arrow (W1-6) signs can be used on a turn per Section 2C.07 and Table 2C-5 (see legend for Figure 1).

One of the improvements that was suggested during the workshop included adding a stop sign at the corner. However, the MMUTCD indicates in Section 2B.04 that it is a state standard that "Yield or Stop Signs shall [*equivalent of "must"*] not be used for speed control". The purpose of adding a stop or yield sign at this corner is solely for speed control, and thus the usage of a stop or yield sign at turn is not a solution that can be pursued.

To improve signage along the corner, the MMUTCD was used to determine various methods for advanced signing at these corners. As the existing method of utilizing the Reverse Turn and One Direction Large Arrow signs are not working to slow traffic. Figure 2C-2 in the MMUTCD was utilized as a more effective and standard way to warn traffic rounding these corners. The proposed advanced sign layout is shown in Figure 2. The Chevron Signs (W1-8) on the outside of the curve will provide more visibility than a single One Direction Large Arrow (W1-6) sign to warn the driver of the upcoming change in roadway alignment. Figure 2 also utilize the optional Turn with Advisory Speed (W1-1aR and W1-1aL) signs to provide additional notification to the driver before navigating the turn. As additional signs are added at the turn, the optional One Direction Large Arrow signs (W1-6L and W1-6R) were not included.

It is worth noting that Table 2C-5 indicates that Chevrons and/or One Direction Large Arrows are recommended but not required when there is a 10 mph difference between the speed limit (25 mph) and the advisory speed (15 mph). The City could consider not including these signs but we would encourage the use of these signs as the MMUTCD recommends usage as these signs will provide more visibility and advanced warning as traffic navigates the curve than the existing configuration.

The MMUTCD also allows the use of Reverse Turn signs that have been previously been installed since the tangent between the curves is less than 600 feet; however, since this existing condition is understood to be not working well due to the current traffic issues on the site as expressed by local drivers, this updated design utilizes four advanced Turn Signs instead of a single Reverse Turn sign per travel direction to more adequately provide advanced warning and visibility for drivers to navigate these curves on Water Street.

An anticipated material cost estimate for the proposed signage is shown in pink in Figure 2 amounts to an estimated $18,500. This cost excludes engineering costs (as an engineering fee is not included as part of this traffic study) and installation costs (as it is expected the DPW would install).

Additional Improvements to Traffic Signage – Dynamic Signage

During the workshop, dynamic signage (which can be LED flashing enhanced signs and/or radar speed signs) also could also be utilized to help provide additional warning and visibility for drivers on Water Street. These signs can be powered by solar power and will need adequate access to sunlight to perform. Prein&Newhof reached out to Carrier & Gable, Inc. (see Figures 3, 4, and 5 below) for pricing on supplying LED flashing enhanced signs and radar speed signs.

Currently there is one similar radar speed sign being used by the City on a signpost right before the first curve heading southbound on Water Street from South Street. However, the intended use of these signs is to advise traffic on their speeds through dense urban settings, typically along straight sections to keep travel speeds within the posted speed limits, improving safety for other roadway users, as such, it is not recommended to keep that sign in its current location. Instead, the existing radar speed signs can be relocated and/or added as shown on Figure 3 on the (2) statutory 25 mph speed signs to advise traffic of their speeds on the straightaways in advance of the curve sections.

LED flashing enhanced signs could also be used on each of the Turn with Advisory Speed signs (4 total) as these signs are the last advanced warning before the curve. For an additional cost and to limit the continual flashing of the lights all night, a radar detection unit kit could be added to these signs to allow them only to activate when a vehicle is approaching the curve.

The cost of adding the two radar speed signs as quoted from Carrier & Gable would be $5,000 each (for a total of $10,000) including the sign assembly, strobe, speed, radar, and solar panel kit. The cost of adding the (4) LED flashing enhanced signs for the curves would be $6,000 per sign (deduction in $2,700 per sign if the City is okay without the radar detection kit meaning the signs continually flash) for a total of $24,000 (or $13,200 if radar detection kits are excluded).

Pavement Markings

One option that the City wanted to consider was painting "SLOW" within the street. This pavement marking is not a standard marking that is detailed in the MMUTCD. Also, studies (in particular, one by Hallmark et. al. [2007]) generally suggest that "SLOW" painted in the street is not effective at slowing traffic down.

To slow traffic down, the MMUTCD recommends Speed Reduction Markings (Section 3B.22) to be used. These markings are "white transverse line on both sides of the lane that are perpendicular to the center line, edge line, or lane line" with "longitudinal spacing between markings [that are] progressively reduced from the upstream to the downstream end of the marked portion of lane." Figure 3B-28 of the MMUTCD details an example of Speed Reduction Markings.

MMUTCD recommends that Speed Reduction Markings only be used to "supplement the appropriate warning signs" and not a substitution for the warning signs. Also, speed reduction lines "shall not be used in lanes that do not have a longitudinal line on both sides of the lane", in which Water Street does not have a white lane line on the edge of road. Thus, we would recommend consideration on new signage or dynamic signage before considering a pavement marking option.

Rumble Strips

The MMUTCD does not include any provisions regarding design/placement of rumble strips. The US Department of Transportation Federal Highway Administration (FHWA) indicates that centerline rumble strips "are an effective countermeasure to reduce head-on collisions and opposite direction sideswipes)". Safety statistics from FHWA suggests urban two-lane roads see a 64% reduction (with 27% standard error) in crash frequency after a rumble strip is implemented. However, rumble strips in an urban environment can result in unwanted noise for neighboring residents, and thus this option was not considered at this time as a recommendation.

Truck Traffic – Truck Routes and Reducing Truck Traffic

One outcome of the workshop was to review possible truck route and/or reduction of truck traffic. Section 257.726 of the Michigan Vehicle Code, or MVC (page 303) details truck route designations and the requirements that need to be followed by local authorities. By ordinance or resolution, a local authority (in this case, the City) can "prohibit the operation of trucks or commercial vehicles on designated highways or streets, impose limitations as to the weight of trucks or other commercial vehicles on designated highways or streets, and/or

provide that only certain highways or streets may be used by trucks or other commercial vehicles." Signage would then need to be required per the MMUTCD. Section 2B.39 Selective Exclusion Signs, Section 2B.61 Truck Route sign and Figure 2B-30 of the MMUTCD details which truck signs could be used to where trucks can drive.

The City of Holland has designated a truck route. The ordinance from the City of Holland along with their truck map have been included in Figures 6 and 7 below. If the City of the Village of Douglas decides to do a truck route, significant consideration should be made on where truck routes are determined and an engineering master plan traffic study for the entire City should occur to determine impacts of limiting truck traffic to specific roads in the City (especially during peak tourism season). This study could also then consider increased speed on Wiley Road to discourage trucks from using Water Street or the addition of a traffic light at Wiley and Blue Star Highway.

It is also worth noting that Water Street currently is designated by the City as a City Major Road by Public Act 51 of 1951, which means that Water Street is of "the greatest general importance" to the City compared to the other roads that are classified as local streets. Other examples of streets classified as a City Major Road include Wiley Road, North Main Street, Blue Star Highway, and Center Street.

Funding from the Michigan Transportation Fund also is allocated based in part on the mileage of roadways under the jurisdiction of each eligible agency and the classification of these roads. Per our discussion with Kelly Bolt, Transportation Planner for MDOT Act 51 (boltk1@michigan.gov; 517-256-9372), Water Street would need to be redesignated as a local road if trucks were not allowed to use it which then would limit the funds available for that road.

A truck route can be considered but would require an extensive traffic study and planning of the City. For the time being, the signage improvement option seems to be the most economical starting point for the City.

Sidewalk along Water Street

Additional signage and/or truck route designation will provide some additional safety for pedestrians, but ultimately the safest option for pedestrians would be to provide their own facilities, i.e. sidewalk or shared-use path. The west side/south side of Water Street appears to be the best location for this sidewalk or shared-use path. Due to space concerns in the right-of-way/utilities and wetland/stream impacts, a 5-foot sidewalk was determined to be the best option in lieu of an 8 foot or 10 foot shared use path.

The project was split into 3 phases: Phase 1 is approximately 850 feet of sidewalk from Wiley Road north to the first corner, Phase 2 is approximately 850 feet of sidewalk around the two corners up to the pump station, and Phase 3 is about 450 feet spanning the wetlands/stream from the pump station north to South Street. The estimate below is for Phase 1 of the sidewalk.

Estimated Construction Cost	$110,000
*Estimated Design Engineering**	$13,000
Estimated Construction Engineering	$9,000
Estimated Contingency	$11,000
Estimated Project Cost	**$143,000**

**Estimated Design Engineering does not include costs of easement acquisition and preparing easement exhibits*

The estimate below is for Phase 2 of the sidewalk. For the sidewalk to be located on the south side of the road, easements are anticipated to be needed from some or all of the properties. It is worth noting that this estimate does not include the legal and engineering costs of obtaining easements.

Estimated Construction Cost	$120,000
*Estimated Design Engineering**	$13,000
Estimated Construction Engineering	$10,000
Estimated Contingency	$12,000
Estimated Project Cost	**$155,000**

**Estimated Design Engineering does not include costs of easement acquisition and preparing easement exhibits*

The estimate below is for Phase 3 of the sidewalk. This estimate assumes nearly 400 feet of 10-foot-wide boardwalk spanning the wetlands and stream. This estimate could be better determined if a wetland delineation occurred as this estimate conservatively assumes the whole low area along the road is wetland. It is also possible that easements will be needed from some or all of the properties for this boardwalk to be installed.

Estimated Construction Cost	$460,000
*Estimated Design Engineering**	$42,000
Estimated Construction Engineering	$28,000
Estimated Contingency	$46,000
Estimated Project Cost	**$576,000**

**Estimated Design Engineering does not include costs of easement acquisition and preparing easement exhibits*

Conclusion

We would recommend the City (at minimum) consider adding the signs as detailed in Figure 1 to assist warning drivers about the curves. Some or all of the dynamic signs should also be considered to provide more warning on both speed and the sharpness of the turns. For pedestrian safety, the City should consider completing phases of the sidewalk to get pedestrians off of the roadway starting with a sidewalk from Wiley Road north to the first curve on Water Street. Pavement markings and rumble strips should not be considered at this time as a signage improvement would be the most effective improvement at this time. Truck routes and an overall traffic study should be considered after any signage improvements.


FIGURE 1 - EXISTING SIGNS ALONG WATER STREET FROM SOUTH STREET TO WILEY ROAD
ONE WAY
SOUTH STREET
SPEED LIMIT 25
SPEED LIMIT 25
Water St
15 MPH
(Removed Figures 3-6)
STAY IN YOUR OWN LANE
YOUR SPEED 20
(Removed Figures 3-6)
WATER STREET
(Removed Figures 3-6)
SPEED LIMIT 25
WATER STREET
(Removed Figures 3-6)
CREST ROAD
(Removed Figures 3-6)
(Removed Figures 3-6)
15 MPH
(Removed Figures 3-6)
WATER STREET
SPEED LIMIT 25
LEGEND
Reverse Turn (W1-3)
One Direction Large Arrow (W1-6)
Interurban Transit Authority
Douglas Public Works Department
STOP
Water St
66th St
Wiley Rd
130th Ave
WILEY ROAD
130th Ave
Google

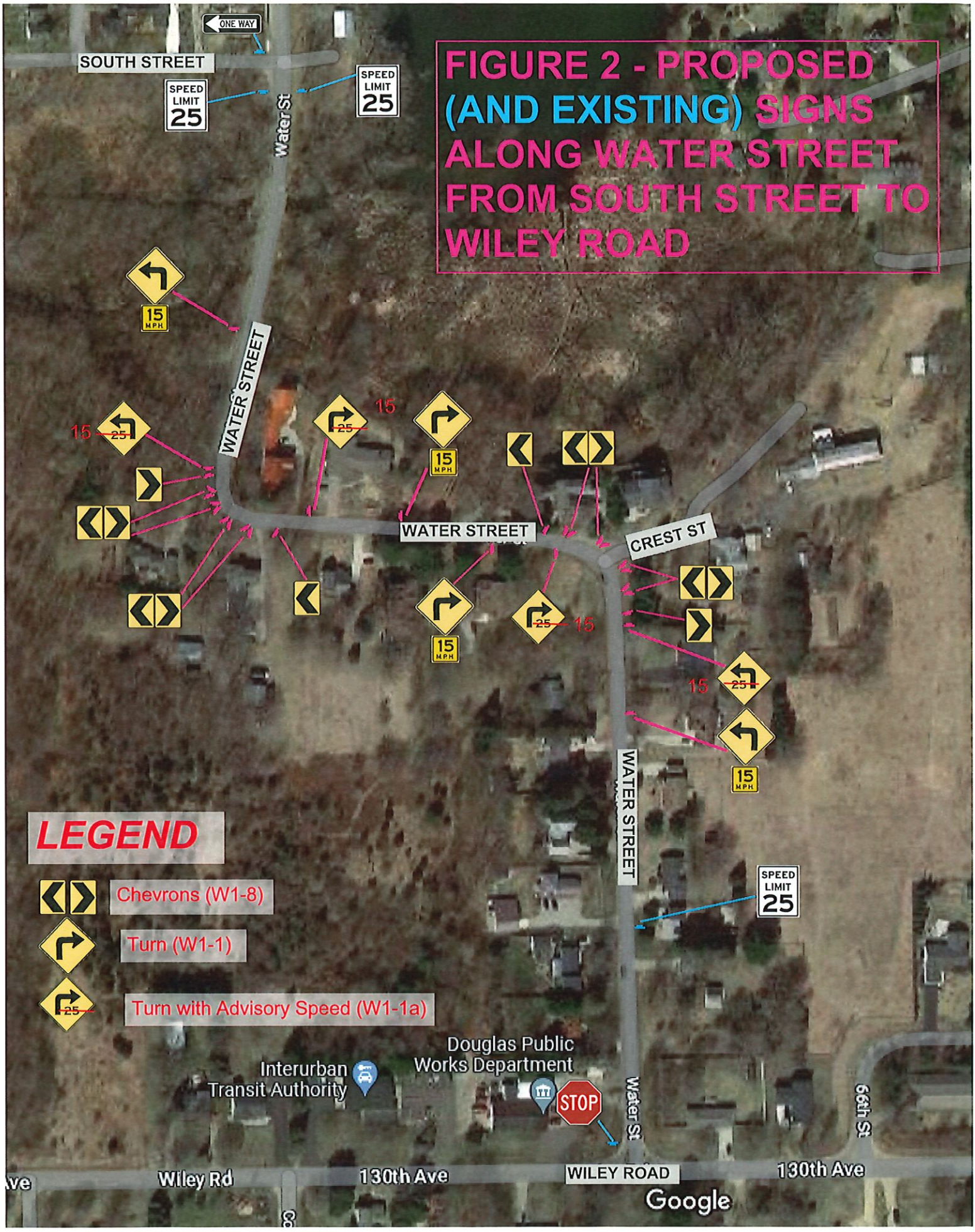
FIGURE 2 - PROPOSED (AND EXISTING) SIGNS ALONG WATER STREET FROM SOUTH STREET TO WILEY ROAD
ONE WAY
SOUTH STREET
SPEED LIMIT 25
SPEED LIMIT 25
Water St
15 MPH
WATER STREET
15
25
15 MPH
15 MPH
WATER STREET
CREST ST
25
15
15
25
15 MPH
WATER STREET
SPEED LIMIT 25
LEGEND
Chevrons (W1-8)
Turn (W1-1)
Turn with Advisory Speed (W1-1a)
Douglas Public Works Department
Interurban Transit Authority
STOP
Water St
66th St
Wiley Rd
130th Ave
WILEY ROAD
130th Ave
Google


FIGURE 3 - PROPOSED (AND EXISTING) DYNAMIC SIGNS ALONG WATER STREET FROM SOUTH STREET TO WILEY ROAD
SOUTH STREET
ONE WAY
SPEED LIMIT 25
DRIVER FEEDBACK SPEED CHECK WITH SOLAR
YOUR SPEED
Water St
FLASHING CURVE LED SIGN WITH SOLAR (INCLUDES RADAR DETECTION KIT)
WATER STREET
15 MPH
WATER STREET
CREST ST
WATER STREET
LEGEND
Chevrons (W1-8)
Turn (W1-1)
Turn with Advisory Speed (W1-1a)
Douglas Public Works Department
Interurban Transit Authority
STOP
Water St
66th St
Wiley Rd
130th Ave
WILEY ROAD
130th Ave
Google

FIGURE 4

LED Enhanced Signs

Data Sheet

carmanah®

LED flashing signs improve driver compliance at crosswalks, school zones, warning and stop signs:

- ✔ Brightest in the industry: more than 1,000,000 mcd daytime light intensity
- ✔ System is reliable, compact and lightweight
- ✔ Solar Power Report™ (SPR) prepared for every location to ensure battery longevity

High-Intensity Light Output

Our LED Enhanced Sign provides high-intensity light output that can improve driver response under all conditions, no matter the time of day or weather. We use the same quality LEDs found in our rectangular rapid flashing beacons, and each sign is powered by Carmanah's robust solar or AC engine. This sign includes nighttime dimming, multiple flash pattern and intensity settings and ambient auto adjust.

Easy Installation

Carmanah's LED Enhanced Signs are conveniently shipped pre-configured from the factory, and installation is quick and uncomplicated—dramatically reducing installation costs. Retrofitting can be done where existing sign bases are used to enhance these sites in minutes, and new installations can be completed without the cost of larger poles, new bases and trenching.

Solar Sizing for Reliable Performance

Carmanah's LED Enhanced Flashing Signs are the most reliable and brightest signs on the market because we're experts at sizing-up solar. Using your sign settings and environmental factors at your location site, Carmanah's solar modeling tool produces a Solar Power Report and recommended product model that will provide dependable, year-after-year operation.

Advanced LED Enhanced Sign Options

Our LED Enhanced Sign comes with an on-board user interface for quick configuration and status monitoring. It allows for simple in-the-field adjustment of flash pattern, duration, intensity, ambient auto adjust, night dimming and many more. An optional manual override switch or wireless connection for local or remote control are also available.

MUTCD COMPLIANT — **MUTCD compliant**

Buy America compliant

5 YEARS — **5-year solar engine warranty**

STOP 3 YEARS — **3-year LED sign warranty**

SOLAR POWER 12 REPORT — **Solar-sized for every location**

FIGURE 4 (Cont.d)

LED Enhanced Signs

Data Sheet

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carmanah®

SIGN TYPES

R1-1
Red LEDs

R2-1
White LEDs

W11-2
Yellow LEDs

S1-1
Yellow LEDs

W1-2
Yellow LEDs

S5-1
White/Yellow LEDs

R1-2
Red LEDs

R5-1a
Red LEDs

R3-2
White LEDs

R5-1
White LEDs

*Many sign shapes, sizes and configurations are available. Contact Carmanah for more information.

SOLAR ENGINE MOUNTING

2.0"- 2.5" Perforated Square Pole Mount

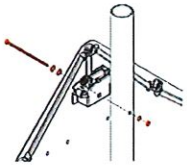
2.38" - 2.88" Diameter Round Pole Mount

3.5" - 4.5" Diameter Round Pole Mount

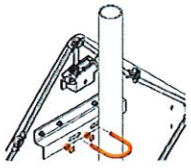
Side Pole Mount

LED SIGN MOUNTING

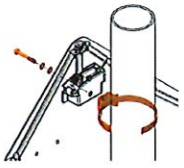
Through Bolt



U Bolt



Banding to Pole



ACTIVATION OPTIONS

Activation	Standard operation is flashing 24 hrs./day
	Optional internal time clock for calendar programming
	Optional manual override switch allows local control of beacons
	Optional junction box: lockable, hinged door, corrosion-resistant aluminum enclosure allows easy calendar programming and access to manual override switch
	Pushbutton: ADA-compliant, piezo-driven with visual LED and two-tone audible confirmation
	Audible pushbutton station: ADA-compliant, piezo-driven with visual LED and customizable voice message confirmation

SYSTEM SPECIFICATIONS

On-Board User Interface (OBUI)	Adjustable system settings with auto-scrolling LED display on our latest EMS
	System test, status, and fault detection: battery, solar, button, beacon, radio, day/night
	Flash patterns: RFB (WW+S), RFB1 (WW+S legacy), RFB2 (WSDOT), 0.5 sec. alternating (MUTCD), 0.5 sec. unison (MUTCD), 0.5 sec. x3 alternating (MUTCD), 0.1 sec. unison, 0.25 sec. unison, 0.1 sec. x3 quick flashes unison, 0.1 sec. x3 quick flashes alternating, steady on
	Input: momentary for pushbutton activation, normally open switch, normally closed switch, dusk-to-dawn operation
	Flash duration: 5 sec. to 1 hr.
	Intensity setting: 20 to 1400 mA for multiple LED enhanced signs
	Nighttime dimming: 10 to 100% of daytime intensity
	Ambient Auto Adjust: increases intensity during bright daytime
	Automatic Light Control: reduces intensity if the battery is extremely low
	Temperature correction: yellow or red LED enhanced signs
	Calendar: internal time clock function
	Radio settings: enable/disable, selectable channel from 1 to 14
	Output: enabled when flashing daytime and nighttime, or nighttime only
	Activation counts and data reporting via OBUI or optional USB connection
Optical	Light intensity: 1,000,000 mcd minimum daytime
	Viewing angle: 15°
	LEDs meet MUTCD optical requirements for color, flash rate and dimming
Sign Construction	MUTCD compliant: 2009 MUTCD, Chapter 2A, 2B, 2C, and 7B Signs
	3M High Intensity Prismatic or Diamond Grade retroreflective sheeting and components
	High-power LEDs in waterproof housings
	UV-resistant polycarbonate channels protect wiring; includes fully integrated junction box
	0.08-0.10" aluminum sign face with stainless steel hardware
Connectivity	Optional encrypted, wireless radio with 2.4 GHz mesh technology
	Optional radio allows calendar program, manual override switch, or input device from one system to remotely control other systems
	User-selectable multiple channels to group different signs and ensure a robust wireless signal
	Instantaneous wireless activation: <150 ms
	Wireless range: 1000 ft (305 m)
	Integrated, vandal-proof antenna
Power System	Solar or AC-powered
	AC: 100-240 VAC input, 6-14 AWG Replaceable AC-DC power supply, circuit breaker, terminal block wiring
Energy Collection	45 deg tilt for optimal energy collection
	Maximum Power Point Tracking with Temperature Compensation (MPPT-TC) battery charger for optimal energy collection in all solar and battery conditions
Energy Storage	Replaceable, recyclable, sealed, maintenance-free, best-in-class AGM batteries offer the widest temperature range and longest life
	Battery design life: +5 yrs.
	Tool-less battery change with quick connect terminals and strapping for easy installation
Solar Engine Construction	Weatherproof, gasketed enclosure with vents for ambient air transfer (NEMA 3R)
	Lockable, hinged enclosure for access to on-board user interface and batteries Optional padlockable latch
	Corrosion-resistant aluminum with stainless steel hardware
	Raw aluminum finish or yellow, black, or green powder coated
	Prewired to minimize installation time
	High-efficiency optics and EMS = the most compact, lightweight system
Environmental	-40 to 165° F (-40 to 74° C) system operating temperature
	-40 to 140° F (-40 to 60° C) battery operating temperature
Warranty	**5-year limited on solar engine, 3-year limited on LED signs, 1-year limited on batteries**

Specifications subject to local environmental conditions, and may be subject to change.
All Carmanah products are manufactured in facilities that are certified to ISO quality standards.

Document: Carmanah_DATA_LED-enhanced-signs_RevC

FIGURE 5

SPEEDCHECK-12

Small, Portable Radar Speed Sign Data Sheet

carmanah®

Affordable radar speed sign system packed with premium features at no additional cost:

- Calendar/schedule operation
- Data collection with visualization and reporting software
- Mobile app for iOS® and Android™
- Rapid-flashing strobe
- Stealth mode
- On-board diagnostic status and health indicators
- 3-year warranty

SPEEDCHECK-12
12-inch digits for speeds less than 45 mph (70 km/h)

Fully Compliant, Ultra-clear Display

Compliant to MUTCD standards for legibility, including LED color, character and letter height. The bright LED display uses 12-inch digits against a background designed for high-contrast visibility that prevents "88" ghosting—ensuring readability in all weather and lighting conditions. The unique safety mask limits the viewing angle to prevent drivers from watching the display as they pass.

Long-lasting, Reliable Operation

The LED display is housed within a durable, weatherproof aluminum unit and is shielded with a tough polycarbonate window for added vandalism protection. Every solar-powered model is solar-sized by location to ensure year-after-year operation. Carmanah includes a Solar Power Report to prove sustainability over a 12-month period.

Easy Installation and Connectivity

The SpeedCheck® sign arrives ready to work out of the box. Its modular, lightweight design and built-in handle allows a single person to install on a pole or flat surface. Bluetooth® allows for quick connectivity and setup via the SpeedCheck Manager mobile app or PC software. A StreetHub™ model comes factory prewired and pretested for remote communication—enabling cloud-based access within minutes. Carmanah's comprehensive support system includes product support technologists and our 24/7 on-demand Product Support Center.

MUTCD compliant

Buy America compliant

3-year limited warranty

Solar-sized for every location

Up to 21 days battery run time

Up to 1000 feet radar detection

CONNECTIVE CAPABILITIES

FIGURE 5 (Cont.d)

SPEEDCHECK-12

Small, Portable Radar Speed Sign Data Sheet

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carmanah®

"YOUR SPEED" STATIC SIGN

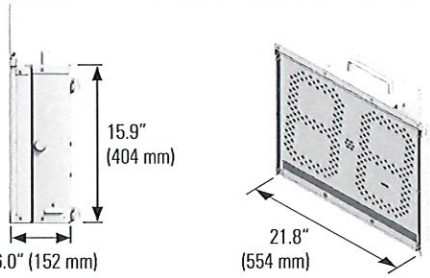
Sign	Meets MUTCD legibility standards for color, character and height
Sheeting	3M High Intensity Prismatic or Diamond Grade retroreflective sheeting and components
Color	Available in yellow, fluorescent yellow/green, white, and orange

24" x 22" (610 mm x 559 mm) *Not FHWA MUTCD compliant

30" x 24" (762 mm x 610 mm)

30" x 36" (762 mm x 914 mm)

LED DISPLAY



LED Display and Strobe	Meets MUTCD legibility standards for character height and LED color for roadways with speed limits under 45 mph
	Seven-segment digit design using 224 amber LEDs LEDs automatically dim during nighttime operation, minimizing light bounce into neighboring windows
	Includes rapid-flashing strobe with white LEDs at the center of the display (with ON/OFF setting)
	Includes stealth mode for data collection
Radar	Detection range up to 800 ft; extended range option available
	Single-direction, K Band Doppler radar (+/- 1 mph) with 12° radar beam width
Construction	Weatherproof, gasketed enclosure with vents for ambient air transfer
	Corrosion-resistant aluminum chassis with stainless steel hardware
	3/16" polycarbonate window protects digital display from weather and vandalism
	Keyed access prevents sign removal and battery theft
Weight	15 lbs (6.8 kg) without batteries

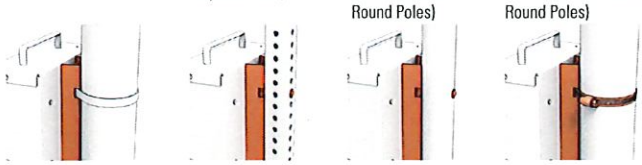
LED DISPLAY MOUNTS

Standard Banding/ Flat Surface

Through Bolt (2" - 2.5" Square Poles)

Through Bolt (2.38" - 2.88" & 4.5" Diameter Round Poles)

Band Clamps (2.38" - 4.75" & 5.5 - 8.25" Diameter Round Poles)



COMMUNICATION AND DATA COLLECTION

Local	Bluetooth mobile app and PC software (SpeedCheck Manager) Download on the App Store · GET IT ON Google Play
Remote	Optional StreetHub model includes fully integrated monitoring unit from the factory and Glance cloud-based software for two-way communication, reporting and monitoring

POWER OPTIONS

Battery	Up to 21 days battery run time (3,000 ADT).
	Batteries housed inside display, includes external battery charger
	Maintenance-free, non-proprietary AGM batteries offer the widest temperature range and longest life
	Batteries can be easily replaced at low cost
Solar	12 VDC operation, solar sized to specific geographic location Includes 12-month Solar Power Report to ensure system sustainability
	System designed for 5+ year battery life
	Integrated solar kit option: includes solar panel, charge controller and batteries; lower cost option
	Separate solar panel and cabinet option: includes batteries, charge controller, room for 3rd-party devices
AC	100-240 VAC in standard configurations.

INTEGRATED SOLAR KITS AND MOUNTS

Top of Pole Mount

Side of Pole Mount

PANEL	LENGTH	WIDTH
30 W	21.5" (545 mm)	15.7" (400 mm)
50 W	26.3" (668 mm)	21.2" (538 mm)

SEPARATED SOLAR PANEL/CABINET AND MOUNTS

Top of Pole Mount

Side of Pole Mount

PANEL	LENGTH	WIDTH
50 W	26.3" (668 mm)	21.2" (538 mm)
80 W	30.7" (780 mm)	26.5" (672 mm)
170 W	59.1" (1500 mm)	26.3" (668 mm)
Cabinet	15.7" x 8.2" x 21.0" (399 mm x 208 mm x 534 mm) Weatherproof, gasketed cabinet with vents for ambient air transfer tested to NEMA 3R; lockable, hinged door with #2 lock	

INCLUDED WITH EVERY SIGN

Software and Mobile App	SpeedCheck Manager mobile app and PC software for setup and programming, including calendar scheduling and data collection, via Bluetooth
	Traffic Analyzer software for data visualization and reporting
Warranty	3-year limited warranty on LED display
	1-year limited warranty on batteries
Support	Carmanah's North American product support technologists available for solution building, solar sizing and troubleshooting
	24/7 access to Carmanah's online Product Support Center database
Customize	Build a SPEEDCHECK-12 online

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FIGURE 6: City of Holland Truck Route Map

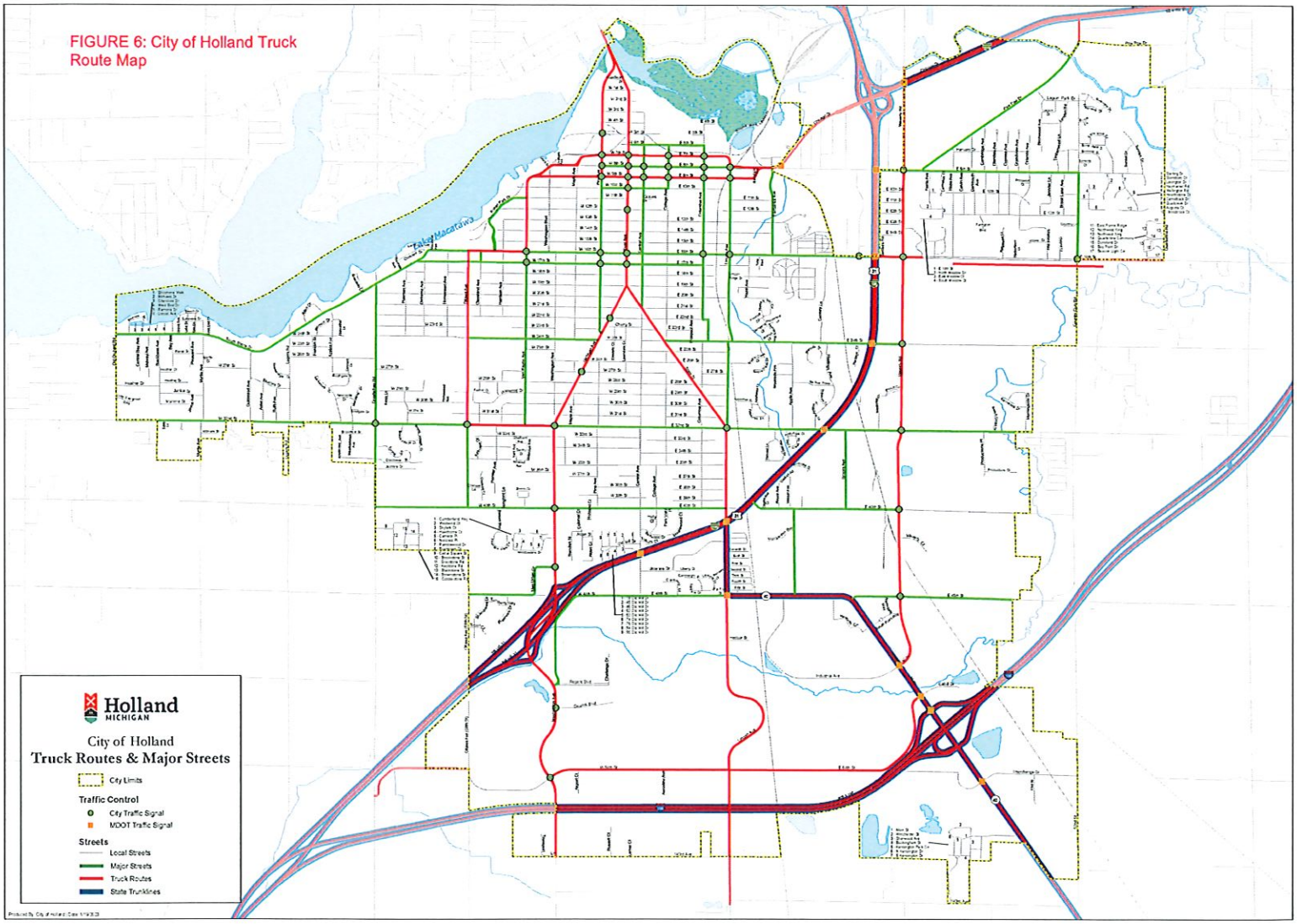

FIGURE 7: City of Holland Truck Route Ordinance

Sec. 18-24. Operation of trucks on specified routes. [Ord. No. 1393, 7-21-2004; Ord. No. 1458, 7-5-2006; 7-21-2021 by Ord. No. 1798]

(a) Truck route limitation. It is unlawful for any person, firm, corporation, or any other entity to operate or cause to be operated a truck as hereinafter defined, on any street, road, public right-of-way, or highway within the City, unless such operation is upon a route designated as a truck route in the schedule referred to in Section 18-1. The City shall procure and have posted appropriate signs along the designated truck route as required by the laws of the State of Michigan.

(b) Truck definition. A "truck," as used herein, shall mean any "truck," "truck tractor," "semitrailer" or "commercial vehicle" or combination thereof having an elected gross weight greater than 10,000 pounds. The word "truck" does not include the following:

(1) Bus, as defined by MCLA § 257.4b;

(2) School bus, as defined by MCLA § 257.57;

(3) Authorized emergency vehicles, as defined by MCLA § 257.2;

(4) Motor home, as defined by MCLA § 257.32a;

(5) Farm tractors and other agricultural equipment, as defined by MCLA § 257.16;

(6) Utility service vehicles or vehicles used for construction in the City while the work is in progress;

(7) Road construction and maintenance vehicles while being used for that purpose inside the City limits;

(8) Refuse trucks while making refuse pickups within the residential districts of the City;

(9) All vehicles owned or leased by the City; and

(10) All vehicles used exclusively to transport personal possessions or family members for nonbusiness purposes.

(c) Additional definitions. The term "City" shall mean the City of Holland. The terms "elected gross weight," "truck," "truck tractor," "semitrailer" and "commercial vehicle" shall have the same definitions as provided in the Michigan Vehicle Code, Act 300, Public Acts of Michigan, 1949,[1] as amended.

(d) Information disclosure. Upon the request of a police officer, it shall be the duty of any person driving or in charge or control of any truck to stop and answer any questions regarding the weight of the truck, its destination, and its point of origin; to proceed to any public or private scale available for the purpose of weighing and determining whether the weight thereof is in excess of the weight limit provided in this section; and such persons shall also present a log book, weight slips, delivery slips, and other written evidence of destination or points of origin, for the officer's examination.

(e) Exception: Commercial and home deliveries, pickups and service. A truck may use or travel upon a street, road, public right-of-way or highway even though not designated as a truck route by the City, for the purpose of delivering or picking up goods, wares, or merchandise, raw materials, or materials which have been processed although the manufacturing process has not been completed or there are

1. **Editor's Note: See MCLA § 257.1 et seq.**

FIGURE 7: City of Holland Truck Route Ordinance (Cont.d)

other steps to be completed in the manufacturing process, or for the purpose of providing services at its destination within the City. In such event, travel along a prohibited route shall be limited to the minimum distance necessary to accomplish the delivery, pickup or service call, and said vehicle shall return to a designated truck route by the shortest route possible.

(f) Exception: Leaving or returning to place of business. Nothing herein contained shall prevent a truck from leaving or returning to its customary storage location at the owner's or operator's business or commercial location within the City which is not located on a designated truck route, provided that the most direct route to and from a designated truck route is used.

(g) Exception: Road repairs. If any designated truck route, or portion thereof, shall be under repair or otherwise temporarily out of use, motor vehicles within the restricted class shall use such other temporary truck routes as may be designated by the Chief of Police or his/her designee.

(h) Unified Development Ordinance (UDO). Nothing contained herein shall authorize the parking of a truck otherwise prohibited under Chapter 39 - Unified Development Ordinance (UDO).

(i) Penalty. A person, firm, corporation or any other entity that violates this section is responsible for a civil infraction.