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Technical Memorandum

Date: April 7, 2023
To: Jill Juliano, P.E.
Transportation Engineer
From: Steve Pautsch, P.E., PTOE
Civiltech Engineering, Inc.
Re: Temporary Intersection Traffic Calming

The Village of Oak Park has requested information regarding temporary traffic calming treatments at minor street intersections to improve the safety of pedestrians crossing the street. Per discussions with Village staff, temporary curb extensions (bump-outs) are the most applicable to the Oak Park intersections in question, thus that is the focus of this memorandum. Both temporary and permanent curb extensions have similar benefits in that they reduce pedestrian crossing distances, can slow speeds of through traffic by visually narrowing travel lanes, can slow speeds of turning traffic by tightening the intersection, and can improve sight distance by physically restricting vehicles from parking too close to the intersection.

Rapid implementation projects are becoming increasingly popular across the country as transportation agencies realize that safety and quality of life benefits are achievable in short timeframes and with a minimum amount of capital investment. Locally, we are familiar with Chicago and Milwaukee's "paint and post" treatments, particularly for curb extensions along arterial and collector routes. We are not aware of any smaller communities within the region that are using this technique for traffic calming.

Chicago Installations

Civiltech has assisted Chicago with several paint and post curb extension projects. Typically, the bump-out space is delineated by double white 4" pavement marking lines. The tan-colored area within these lines is MMA (Methyl Methacrylate), which is a durable pavement marking material used for coloring large areas. White, 28-inch, retroreflective-banded flexible delineators are installed at five to ten-foot spacings, offset about one foot inward from the double white lines. The flexposts are left in place through the winter. The bump-outs can be "shadowed" by a white parking lane line to help ensure that approaching motorists appropriately laterally distance themselves from the curb, especially during times when on-street parking utilization is low. Paint and post curb extensions have been employed on a number of corridors in Chicago such as Milwaukee Avenue, Chicago Avenue, and 79th Street as part of standalone safety projects although they are also commonly seen as part of protected bicycle lane projects. Some of the locations substitute the tan MMA

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with decorative markings and there are a few installations where planter pots or other objects are used instead of the delineators. The delineators and pavement markings are initially installed by contractors although the delineators can be maintained by in-house crews. City of Chicago specifications for MMA pavement marking material and the flexposts are attached to this memorandum.



State & Kinzie



Chicago Avenue & Lamon Avenue

It is the intent of CDOT to replace many of the temporary curb extensions with permanent raised-curb concrete bump-outs as funding becomes available or in conjunction with an upcoming capital project such as a roadway resurfacing. There is no Chicago area data available regarding safety benefits or drivers yielding to pedestrians. As might be expected, the flexposts are often struck by vehicles and require periodic replacement. The longevity of these posts varies based on the location but the lifespan is probably somewhere between three months and two years. The temporary curb extensions are still too new to confirm the maintenance requirements of the MMA pavement markings.

Milwaukee Installations

Milwaukee has recently installed a number of paint and post curb extensions as part of their initiative to combat reckless driving and improve safety for all users. The design of these facilities is very similar to Chicago, except that the flexposts are centered within the double white lines. Another difference is the fill pavement marking material is epoxy rather than MMA. A follow-up study by Milwaukee has shown that for the pictured 27th Street project, drivers are yielding to pedestrians 23% more often. Milwaukee intends to follow up in the future with permanent raised-curb concrete bump-outs. We don't have information regarding the maintenance needs of the delineators or striping, but we anticipate that it is similar to Chicago, as the characteristics of the streets on which they are installed are similar.

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27th & Richardson

Benefits and Trade Offs

Following are some of the advantages and challenges related to paint and post bump-outs compared to permanent bump-outs.

Benefits of Paint and Post Bump-Outs

- Costs are lower
- No impacts to drainage
- Can be implemented expeditiously
- Configuration can be adjusted after installation

Trade Offs of Paint and Post Bump-Outs

- Less aesthetically pleasing
- Require more frequent maintenance (flexible delineator replacement, pavement marking refreshing)
- Inaccessible to street sweepers so dirt and debris may collect between the posts and the curb
- Snow removal may be more challenging
- Less robust protection for pedestrians
- Cannot improve stop sign or warning sign visibility by relocating them into bump-outs

Application to Oak Park

It is our understanding that the temporary bump-outs are contemplated to be installed on local streets or low volume collector streets. While we are not aware of any such installations on low volume streets in peer cities, there is no technical reason why this would not be feasible. Because most of the residential Oak Park intersections are smaller than the Milwaukee and Chicago examples, the bump-outs may only be feasible on certain intersection legs and may not be able to extend through the corner radii. Further investigation would be required to develop a typical design suitable for Oak Park but this design would still vary somewhat depending on the geometric and traffic characteristics at each location.

With regards to maintenance, we anticipate that the lifespan of the flexible delineators would be longer than Chicago and Milwaukee since traffic volumes and heavy vehicle turning movements would be much lower. Initial costs could be reduced by omitting the pavement marking fill, although this would reduce the visual prominence of the bump-outs. If pavement marking fill is desired, MMA has some advantages over epoxy since it can be installed at any temperature, is more durable, and dries quickly. The primary disadvantage of MMA is that it is more expensive than other pavement marking materials.

Temporary paint and post bump-outs are a potential tool to be considered for Oak Park's traffic calming toolbox. They have many of the same benefits as concrete bump-outs but can be built quickly and at a comparatively low cost. In order to minimize future maintenance burdens, Civiltech recommends following common industry practice and install temporary traffic calming features only if one of the two following conditions is met: 1) as a short-term trial to test whether a certain traffic calming treatment is feasible/beneficial at a certain location; 2) as a short-term installation to bridge the time period until a permanent project can be constructed. Finally, we recommend that the Village develop a maintenance plan prior to proceeding with installation of any paint and post project.

Invest South/West Austin:
Chicago Avenue Improvements – Section 2
Central Avenue to Laramie Avenue
CDOT Project No. S-2-338
Specification No. TBD

ITEM 92 - *** - METHYL METHACRYLATE PAVEMENT COLORIZATION, GREEN**
ITEM 93 - *** - METHYL METHACRYLATE PAVEMENT COLORIZATION, WHITE**

Description:

The work will include the application of Methyl Methacrylate (MMA) Acrylic high friction colorized surface for Bike Lanes. The colorized surfaces shall be applied according to the manufacturer's specifications and as amended in these specifications.

Materials:

The MMA acrylic bike lane pavement marking material must be Methyl Methacrylate Acrylic material with Green pigment for bike lanes and include anti-skid abilities as described below. Color pigmented resins shall comply with FHWA color guidelines

1. Pigmented Resin.
 - a. Color pigmented resins shall comply with FHWA color guidelines
2. Anti-Skid Aggregate.
 - a. For all designated bike lanes, a durable aggregate with a minimum hardness of 7.0 per Mohs Hardness Scale must be used and incorporated into the 'Green' pigmented MMA acrylic resin.

Submittals:

- a. Product Data describing physical and performance characteristics and colors available
- b. Material Certification: Provide a Manufacturer's written certification that the material complies with these specifications.
- c. Samples: Submit manufacturer's sample of materials, finishes, and colors
- d. Quality Control Plan
 - Description of equipment for placing MMA
 - Description of equipment for measuring, mixing, placing, and finishing MMA
 - Method for protecting areas not to receive MMA
 - Cure time estimates for MMA
 - Storage and handling of MMA components
 - Disposal of excess MMA and containers
 - Contingency plan for possible failure during the MMA application including remediation

Construction Requirements:

Construction of bike lane pavement markings shall be in accordance with manufacturer application and installation procedures, Standard Specifications for Construction, and Engineer.

All pavement marking areas shall be laid out by the contractor and then reviewed by the Engineer. Approval of the marking layout shall be approved by the Engineer prior to placement of material.

Surface preparation shall include cleaning and preparation of the pavement surface using high pressure water, compressed air, sand-blasting or shot-blasting. Both asphalt and concrete surfaces shall be prepared and approved by the material manufacturer and the engineer. Concrete surfaces shall require shot blasting preparation in addition to any other methods of preparation used. All surface damage shall be corrected by the Contractor at the Contractor's expense, as directed by the Engineer. Manufacturer recommended pavement and air

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temperatures must be followed.

New Hot Mix Asphalt shall have been placed 15-30 days prior to installation of the MMA acrylic colorized material and surface oils shall not be present. MMA acrylic colorized material applied on concrete surfaces shall receive a base coat application and shall be included in the pay item. Marking layout, material mixing, base coat application, and pigmented coat application shall comply with the manufacturer's installation procedures.

The Contractor shall protect the pavement markings from damage and allow them to fully cure prior to allowing traffic to drive over markings. Any damage shall be corrected by the Contractor at the Contractor's expense.

Method of Measurement: The quantity to be paid will be the area in square feet of METHYL METHACRYLATE PAVEMENT COLORIZATION of the color specified, measured in place, completed and accepted.

Basis of Payment: This work will be paid for at the Contract Unit Price per square foot for METHYL METHACRYLATE PAVEMENT COLORIZATION, GREEN and METHYL METHACRYLATE PAVEMENT COLORIZATION, WHITE, which price will include all material, labor, equipment, and surface preparation needed for the installation.

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ITEM 106 - *** - TUBULAR FLEXIBLE DELINEATOR**

Description: This work shall consist of furnishing and installing Flexible Delineators on asphalt and concrete pavement and open metal grating on bridges.

General Requirement: Contractor shall provide new and unused low density polyethylene Flexible Delineator post, fastening screws, base, and anchor bolts. Must be engineered to meet Manual on uniform Traffic Control Devices (MUTCD) specifications for nighttime use including, but not limited to (1) height of 28” and (2) provide two 3” wide white or yellow retroreflective bands placed 2” from the top and spaced 3” between the bands. All colors must be within tolerance limits as specified in the MUTCD and 23 CFR Part 655, Appendix to Subpart F. All bands shall meet MUTCD retroreflectivity requirements. Flexible delineators shall be made of materials resistant to extreme temperature changes in the range of -20 F to 160 F, ultraviolet light, ozone, hydrocarbons, stiffening with age, and a series of direct wheel impacts with speeds varying up to 65 mph, and rebounds to a vertical position if struck by a standard vehicle. Units shall meet NCHRP 350 crashworthy requirements.

Post locations and color combinations are specified on plan sheets. Contractor shall be prepared to install the following post and band colors combinations. All bases shall be black.

- White post with white band
- Yellow post with yellow band

Contractor shall affix heavy duty base to pavement or metal grating with 2.5” anchor bolts. Heavy duty base shall be designed to hold the post securely to the pavement with 2.5” anchor bolts. Post shall be affixed to the base with fastening screws. Anchor bolts shall be one-piece finished hex head, integral washer, dual lead threads and chamfered tip for installation in concrete or asphalt. One-piece bolts shall be used to eliminate improper assembly, dual threaded bolts shall be used to prevent bolts spinning in holes when tightened. All units shall be completely removable with standard power tools.

Method of Measurement: The flexible delineator shall be measured on a per each basis, for each entire assemble installed and accepted. The entire assembly shall include post, fastening screws, base and anchor bolts.

Basis of Payment: TUBULAR FLEXIBLE DELINEATOR shall be paid for at the contract unit price per each unit installed and accepted.