Tactile Edge
2022 Evaluation Summary

Overview

Minneapolis Public Works has installed a tactile edge between the bikeway and sidewalk on two recent roadway reconstruction projects including Hennepin Avenue Downtown between 12th Street North and Washington Avenue South and 4th Street Downtown between 2nd Avenue North and 4th Avenue South.

Figure 1: Hennepin Ave and 4th St S project extents with the tactile edge treatment

Early in the Hennepin Avenue reconstruction project, the project design team reviewed best practice research, guidance, and treatments for multimodal design. The guidance reviewed included the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*, the Federal Highway Administration (FHWA) *Separated Bike Lane Planning and Design Guide,* FHWA *Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities,* FHWA *Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts,* and the National Association of City Transportation Officials (NACTO) *Transit Street Design Guide*. The review focused on separating users, minimizing and managing conflicts between users, and legibility. A key recommendation from this research was the installation of a detectable/tactile edge between the bikeway and sidewalk where they are directly adjacent. Research of this treatment type shows the following benefits:

- Detectable feature to help guide pedestrians to cross at designated locations;
- Accessible design treatment intended to be walked or rolled over while being detectable by canes;
- Maximizes usable sidewalk width – no decrease in the Pedestrian Access Route (PAR) since it does not require an offset distance from the bikeway.

Although this treatment type has shown to be successful, there is limited research of its effectiveness in the United States as well as insufficient information on how this treatment performs in winter conditions and how the material stands up to winter maintenance and freeze/thaw cycles.

Goals of Evaluation

The goal of this evaluation work is to understand how this treatment type functions in real life conditions and inform decisions related to inclusion in future projects and/or any changes in construction or product selection. This evaluation focuses on winter maintenance, seasonal functionality (ice/rain), user experience, operation observations, and the application of use. Staff will aim to answer the following questions with this evaluation work:

- Is the tactile edge functioning as anticipated by creating accessible delineated space?
- Is the design and material standing up to winter conditions and maintenance?
- When and how should the tactile edge be used in projects?

This evaluation work is to help inform the use of this treatment type in future roadway projects within the City.

Evaluation Metrics

Staff collected both qualitative and quantitative data as part of this evaluation effort. These included:

- Site Visits
- Interviews with key stakeholders and users
    - Minneapolis Advisory Committees including the Bicycle Advisory Committee (BAC), and the Minneapolis Advisory Committee on People with Disabilities (MACOPD)
    - Downtown Improvement District (DID)
    - Blind, Inc. students and staff (site visit 5/27/2022)
- Conversations with TMR and DID related to winter maintenance
- Conversations with TED to understand installation needs and installation lessons learned.

All interview and meeting summaries can be found in Appendix B.

Product Details

There are two types of tactile edge products that have been used on the Hennepin Downtown and 4th St projects: tactile edge plates that come in 6” and 12” widths and a Methyl Methacrylate (MMA) formed tactile edge. Both of these products include raised strips that are intended to be cane detectable for people who are low vision or blind to help signify an edge while also providing directionality. Figure 2, right, shows a visual comparison of these two products. Specific for each of these products are described below.

Figure 2: Tactile edge products, plate vs MMA

TACTILE EDGE PLATE

Tactile edge plates are made of a plastic material and are the most used tactile edge treatment in the Hennepin Downtown and 4th St reconstruction projects. These plates are inset 0.75” into freshly poured (wet) concrete and bolted into place. The raised strips on these plates are 0.2” tall. These plates come in both 6” and 12” widths. The standard plate used for both the Hennepin Downtown and 4th St reconstruction projects can be seen in Figure 3, below left. Figure 4, below right, shows the tactile edge being installed on Franklin Ave.

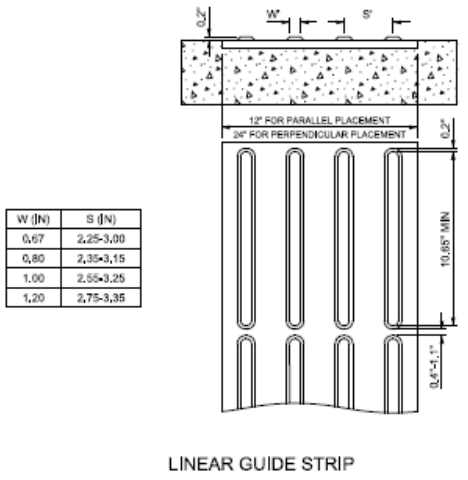


Figure 3: tactile edge standard plate used for the Hennepin Ave and 4th St reconstruction projects

Figure 4: tactile edge plates being installed on Franklin Ave

MMA

The MMA tactile edge is created by pouring a strip of MMA over the cured concrete and dragging along a ribbed template to create the raised strips. This treatment has only been used in select locations where the tactile edge plates cannot be bolted down such as over Xcel Energy vaults. Figure 4, below left, shows the MMA product details from the manufacturer, Vanguard. Figure 5, below right, shows the installation process for the MMA tactile edge. This product mimics the same color and roughly the same dimensions as the tactile edge plates.

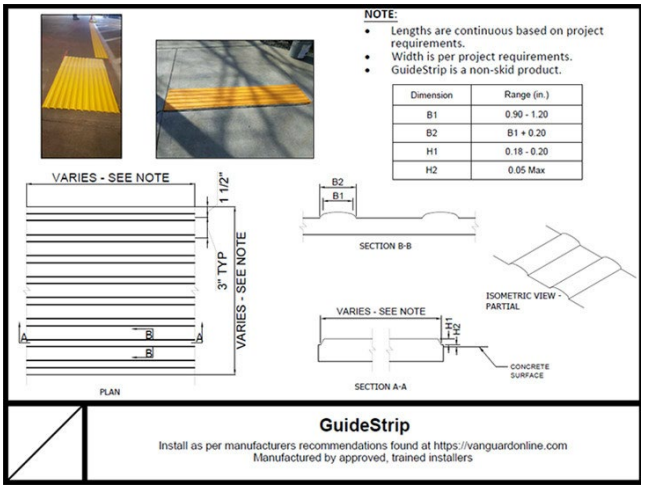


Figure 6: installation details for MMA tactile edge product from the manufacturer, Vanguard

Figure 5: MMA tactile edge being installed on 4th St over Xcel Energy vaults

Current Guidance in the Street Design Guide

G Detectable edge

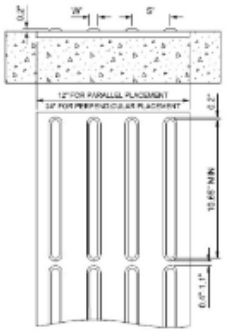
In areas where a sidewalk-level bike lane is located adjacent to the pedestrian clear zone [link], a detectable edge (also referred to as a directional guideway) should be utilized to provide visual and tactile delineation between the sidewalk and bike lane.

1. The detectable edge should be a minimum of 6" wide (1' preferred) and should be located parallel to the bikeway between the pedestrian clear zone and bikeway.

2. The detectable edge should run to the corner bicycle and pedestrian mixing zone (link), but should not run through the corner mixing zones to prevent impacts to sloping grades, detectable ramps, APS push button placement, and to reinforce that pedestrians maintain the right of way in this area.

3. Preferred detectable edge designs are currently being piloted and are under evaluation. This guide will be updated to reflect the recommended directional guideway design elements once evaluation has been completed. Figure 3.4K shows details for one example design.

Figure 3.4F.3: *Example of detectable edge between sidewalk level protected bike lane and sidewalk*



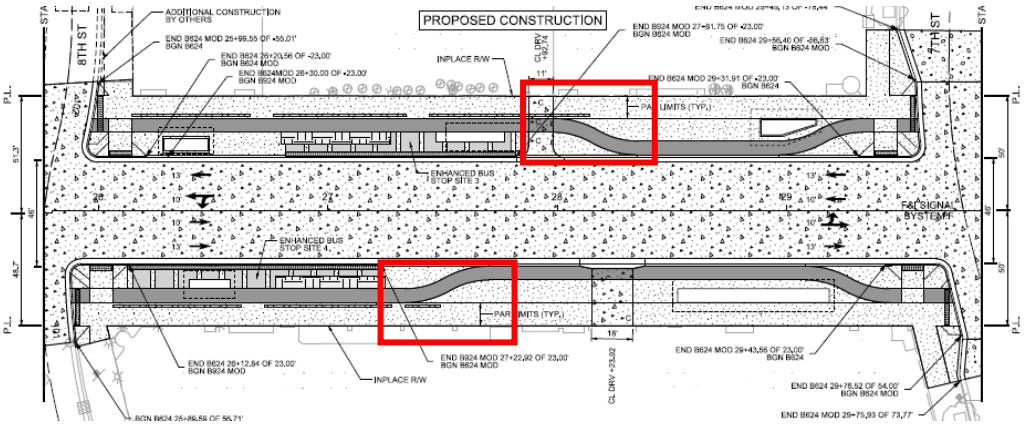
*Note that this detectable edge design is currently being piloted and is under evaluation.

Current Application of Use: Hennepin Downtown & 4th St Reconstructions

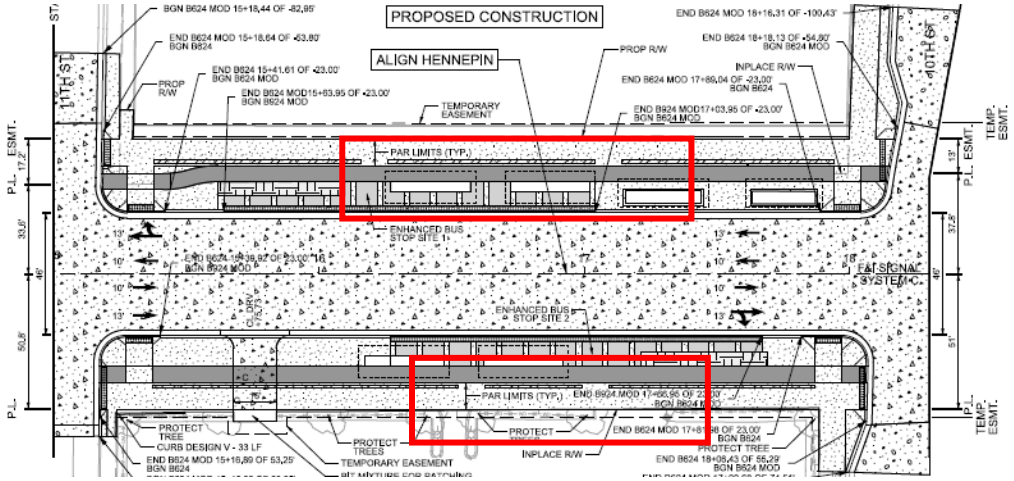
The use of the tactile edge treatment on Hennepin Downtown and 4th St was evaluated as part of this study. There are some similarities in how the treatment is used between these two corridors such as where the bikeway and sidewalk are directly adjacent. However, there are several differences in the application of use for this treatment within these two corridors such as how they are used at corners and locations where the bikeway is not directly adjacent to the sidewalk. The section below provides a series of plansets from each of these projects to articulate the applications of use.

We heard strongly through conversations with users that consistency in the use of this treatment is paramount to allowing users who are low vision or blind to learn and understand the tactile edge. More specific feedback from users can be found in Appendix B and is also summarized later in this report.

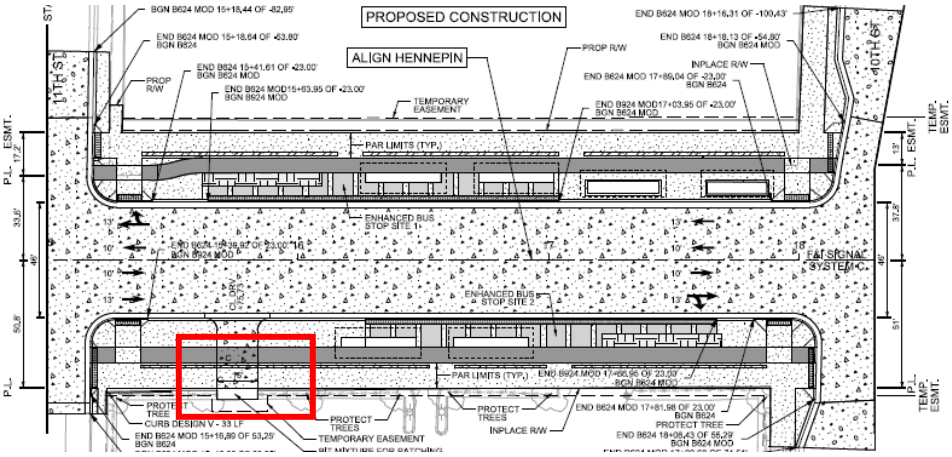
- Tactile edge is used when the sidewalk/PAR is directly adjacent to the bike facility - tactile edge is discontinued when the bikeway bends away from the sidewalk/PAR



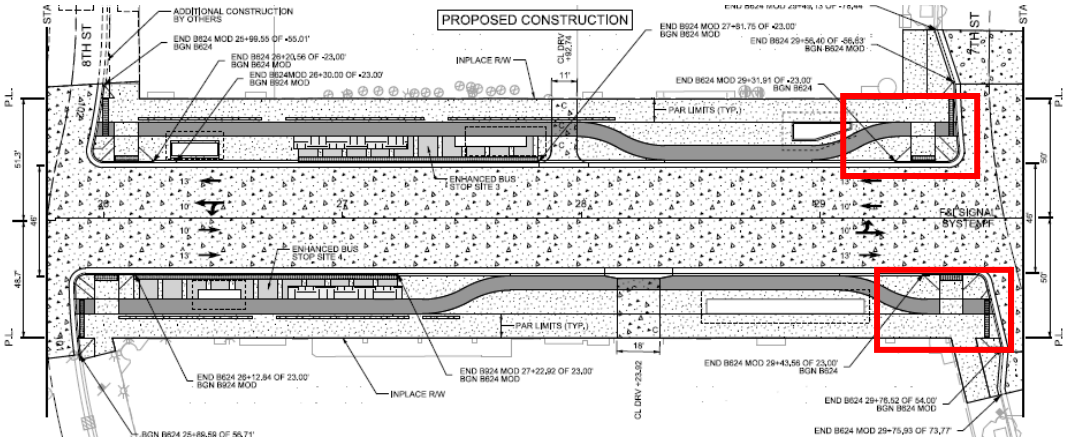
- There are breaks in the tactile edge at BRT platforms that signify a crossing of the bikeway to the BRT platform



- Tactile edge crosses driveways without breaks

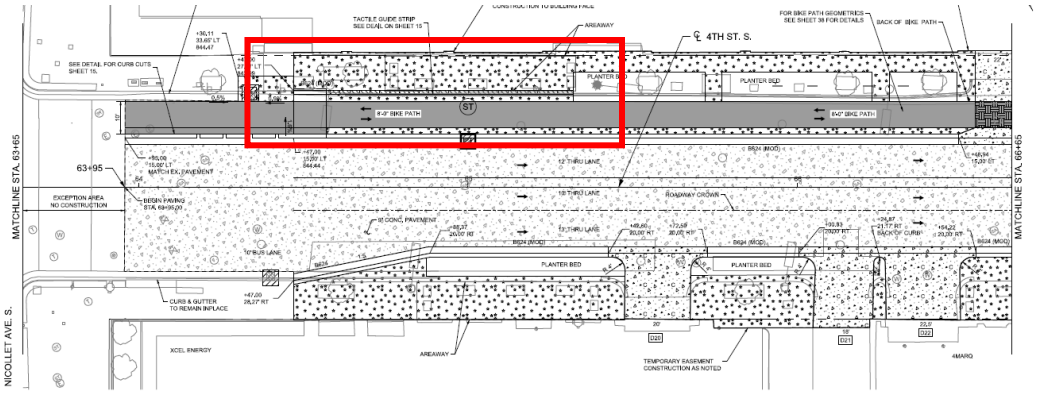


- The tactile edge is not used at the corners/approaching intersections where the bikeway bends out and is adjacent to the sidewalk/PAR

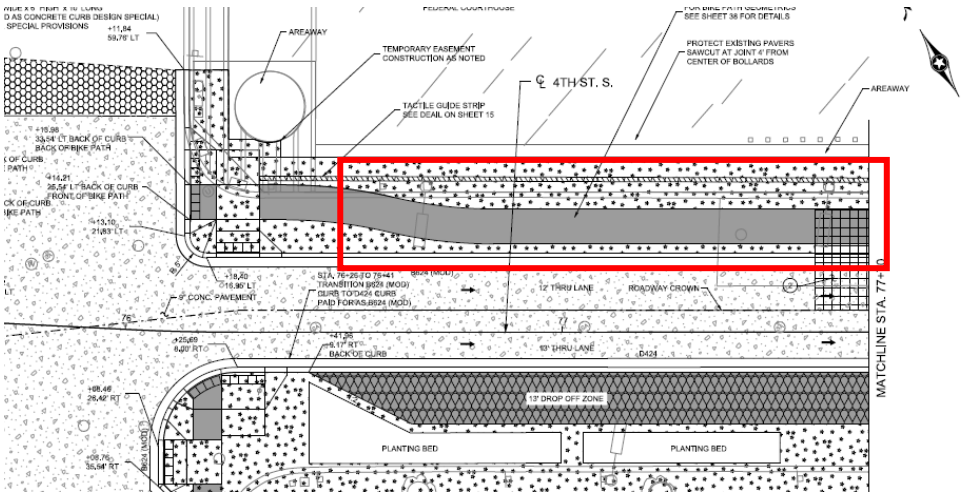


4TH STREET DOWNTOWN

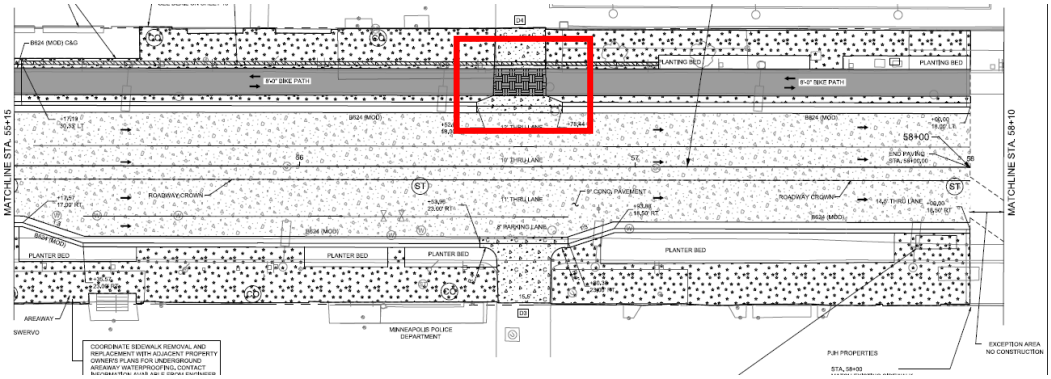
- Tactile edge is used in locations where the bikeway and PAR/sidewalk are not directly adjacent but where there are no other physical elements such as planter beds that separate the PAR from the bikeway. The example below shows a location where the tactile edge follows the bikeway edge rather than the edge of the PAR



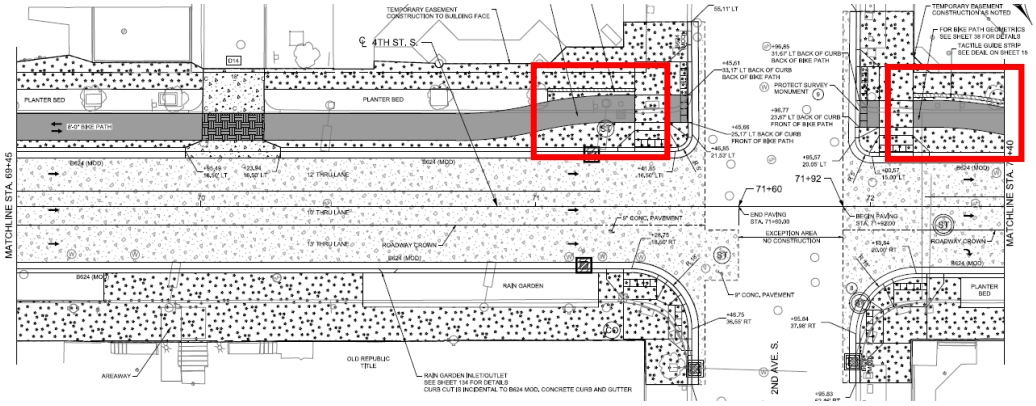
  - There are select locations where the tactile edge follows the PAR even when not directly adjacent to the bikeway (Marquette-2nd)



- Tactile edge crosses driveways without breaks



- Tactile edge is generally used where the bikeway bends out at the intersection and is adjacent to the PAR



Key Findings

USER FEEDBACK & OPERATIONAL OBERSEVATIONS

Staff brought this discussion item to the BAC and MACOPD to understand the user experience of this treatment type. Members of these committees were involved in early conversations surrounding the selection of this treatment type in the Hennepin Downtown reconstruction project. These conversations were centered around the user experience along this corridor and were used to understand if, where and how the tactile edge should be used in future projects. In addition to discussions with the advisory committees, staff partnered with Blind, Inc. and the National Federation of the Blind to host a site visit of both Hennepin Downtown and 4th Street to get user feedback of the tactile edge. Below is the key feedback received and observations made during these conversations and site visit:

- Curb or boulevard space is better than tactile edge but works in constrained locations
- The tactile edge signals “be aware” and is used as a delineation aid more so than a directional aid – tactile edge acts as a curb, as a warning, and is helpful to have next to/follow bikeway
    - Tactile edge should be included at the corners where the bikeway bends out to better delineate space at the intersection and signal to users who are low vision and blind that there is a bikeway
- The MMA tactile edge is not as detectable and is less audible than the tactile edge plates
    - Tactile edge plates are preferred

- The MMA tactile edge installed on the NE corner of Marquette & 4th St is especially difficult for low vision and blind users since it is not as detectable and is located at the beginning of a block. The use of this particular product at this location makes it difficult for users to know that the tactile edge is there/that there is something to be aware of
    - Use of the MMA midblock would be more acceptable as people using a cane could more easily locate the edge while following along the tactile edge plates both before and after the MMA tactile edge

- Gap in tactile edge at bus stops:
    - Signalizes that something is there but users don't necessarily know what it is
    - The separation distance can create perception of a corner or crossing zone
    - Unusual uses/implementations are harder to figure out
- Overall, it will take time for people to learn the purpose of tactile edges and how to use them – consistency between designs is important

WINTER MAINTENANCE

The following findings were identified through conversations with staff from TMR, the Downtown Improvement District (DID), the Hennepin Downtown Reconstruction project team, and adjacent property owners to understand how this treatment performs in winter conditions:

- Best when cleared with a brush vs. a shovel/plow/blade
    - Blade edges can catch the corners and have caused some chipping/cracking of the plates – easier to catch onto the tactile edge than a brush
        - Biggest challenges have been for the tactile edge plates located across driveways where there is generally larger snow clearing equipment being used – has caused a few plates to break off and need to be replaced (Hennepin Ave)
    - Brushes clears snow/ice between the grooves more effectively than shovels/plows/blades
        - Challenge: The City does not control what equipment private property owners use to clear the sidewalks
- MMA tactile edge has seen minimal wear and tear through first winter season
- Cast iron would likely be a more durable material solution that would stand up better to winter maintenance and winter maintenance equipment
    - The tactile edge is not currently made in cast iron material but should be considered for use if it becomes available

INSTALLATION NEEDS

As the tactile edge is a new treatment type, staff is continuously learning what works and does not work in terms of installation. The following findings were identified through conversations with TED staff who have been closely

involved with the installation of both tactile edge products on recent reconstruction projects. This list is not exhaustive and will likely be refined as we continue to learn more about this treatment type:

- There is a need for more clear treatment type and installation specifications
    - In some locations two 6" tactile edge plates have been used side by side to create a 12" strip rather than using a solid 12" tactile edge plates. We have seen more maintenance challenges at these locations due to the number of corners that are able to get caught by blades during winter snow clearing
- There needs to be a 3" minimum clearance from any concrete joint to minimize the tactile edge plates breaking away from the concrete; 6" clearance is preferred.
- Tactile edge plates may need to be cut to a desired length – if this is the case, cut plates should not be at the beginning or end of a run and cuts should not be made across the ridges
    - This can cause the edges to more easily be caught by blades because it does not have a beveled edge

Conclusions & Staff Recommendation

The tactile edge is functioning as anticipated by delineating space and providing a tactile warning edge between sidewalk space and bike facilities, however, it provides less directional guidance than originally identified in peer research. The current tactile edge product is standing up decently to winter conditions and winter maintenance with some chipping at the corners from the use of winter maintenance equipment. A cast iron tactile edge would be preferred over the existing plastic product if that becomes an available option in the future.

The current guidance in the Street Design Guide (SDG) provides a solid foundation for the tactile edge treatment; however, more detail/clarification is needed to reflect the lessons learned from this evaluation work. Staff recommends the following next steps as a result of this evaluation:

1. Provide more clarity in the SDG surrounding the application of use based on user feedback to ensure consistency across all projects.

2. Develop a standard plate and installation guidance for contractors based on installation needs, user feedback, and winter maintenance lessons learned.

Appendix A – Core Team Members

Core Team Members

Transportation Planning & Programming: Amy Barnstorff, Katie White, Kelsey Fogt

Transportation Maintenance & Repair: Steve Collin

Transportation Engineering & Design: Rick Kreuser

Transportation & Parking Services: Jesse Sanju

Appendix B – Meeting Summaries

1/27/2021 – CORE TEAM MEETING

Attendees: Amy Morgan, Katie White, Steve Collin, Jesse Sanju, Rick Kreuser, Matthew Dyrdahl, Kelsey Fogt

Key discussion items

- Product durability – some corners beginning to chip from winter maintenance, hit with plows
- Tactile edge is outside of the bikeway and therefore cleared by private property owners, not the City
    - Raises questions of long-term maintenance and repair/replacement responsibility
- Stakeholder groups to connect with:
    - Individual property owners (sidewalk maintenance)
    - BOMA
    - MACOPD
    - BAC

3/11/2021 – EXTERNAL PARTNERS; HENNEPIN COUNTY, MNDOT, METRO TRANSIT

Attendees: Amy Morgan, Katie White, Sonja Burseth, Paul Lamb, Mackenzie Turner Bargen, Kristie Marie Billiar, Todd Grugel, Jordan Kocak, Derek Sunstrom

Key discussion items:

- MnDOT standards: cast iron: been using for over 10 years, only product that has stood up to roadway plows
    - Would be great to work with foundries in the area to develop cast iron product – likely issues of economies of scale
- Pavers and textured concrete aren't detectable, this product seems better
- Concerns with understandability and legibility since it is a new treatment with not a lot of use yet
- Question: will there be any long-term settling issues with it being inset into the concrete?
- Need to talk to advocacy groups
- Need to understand how the whole segment is working, especially intersections

3/25/2021 – EXTERNAL PARTNERS; DID

Attendees: Amy Morgan, Katie White, Ben Shardlow, Jesse Osendorf

Key discussion items:

- Have not seen many issues with the tactile edge during first winter
- Shovels/blades leave snow on the surface, brooms clear the strip much better
- Seems like a good treatment option compared to the alternatives that were proposed
- Lack of people DT to see how people are using the treatment, lack of transit/transit riders due to detour
    - Would be good to revisit once there are more people downtown
- Hamilton coming to Orpheum in July – good opportunity to observe user behaviors – will get cameras out for observations
- Upcoming meetings to discuss: Hennepin Ave weekly construction meetings – best way to get in touch with immediate stakeholders

4/2/2021 – HENNEPIN DOWNTOWN STAKEHOLDER MEETING

Key discussion items:

- Interested in more creativity with this treatment – different colors, etc.
- Curious if we do anything with concrete stamping instead
- Few areas did chip but product seems to be holding up pretty well overall

5/19/2021 – Minneapolis Advisory Committee for People with Disabilities

Key discussion items:

- New treatment, concerns with the legibility and being able to understand how to use the treatment
- Do not understand what the breaks in the treatment signify – confusing
- Corners can be confusing because the treatment just ends
- Vertical elements/furnishing zones preferred over tactile edge

6/1/2021 – BICYCLE ADVISORY COMMITTEE

Minneapolis
City of Lakes

Bicycle Advisory Committee Resolution

To: Minneapolis City Council, Minneapolis Public Works

From: Minneapolis Bicycle Advisory Committee

Date: June 23, 2021

Subject: Hennepin Ave Downtown Tactile Strip Bike Ride

Hennepin Ave Downtown Tactile Strip Bike Ride

To increase the effectiveness of the tactile strip, the Bicycle Advisory Committee recommends adding mid-block bike stencils with directional arrows to help clarify and reinforce the bikeway versus the sidewalk space. The BAC also recommends correcting the planter box in the clear zone of the bikeway between 11th St S and 12th St S and the bike box at the intersection of 12th St S and Hennepin Ave S. The BAC also recommends the City work with businesses along the corridor to provide education and guidance regarding possible conflicts between patrons and bike lane users. Finally, the BAC recommends that the City, DID, and Metro Transit work together to help make sure winter maintenance is handled well.

Given some of the concerns the BAC has for conflicts between people walking and biking, and uncertainty of the ability of the tactile strip to address those issues, the BAC requests an evaluation update in 2022.

First Avenue Reconstruction Project – Hennepin Avenue Site Visit with Blind, Inc. and National Federation of the Blind

May 27, 2021

Group 1 Notes

- Tactile strip along the bikeway
    - Walk alongside tactile not on top of it
        - Assumes bike space is closer to street
    - Bumps versus elongated linear strip not easily perceptible with cane movement
    - Audible difference with cast tactile is beneficial
    - Tactile strip signals 'be aware' but not used to shoreline it
    - Excess space between tactile and bikeway not necessary
    - Curb or boulevard space is better than tactile strip – tactile strip acts a bit like a curb – as a warning
- Gap in linear tactile at bus stop
    - The gap shows something is there
    - The separation distance along with the tactile edge at curb can create perception of a corner or crossing zone
    - Unusual uses/implementations is harder to figure out
- Corners
    - Protected bikeways protect bikes from cars not pedestrians from bikes
    - Low-vision cue against right curb to align for street crossing
        - Fan curbs or bikeway are hard to detect for alignment or unknowingly aligning in bikeway
    - Angled or skewed crossings are difficult – aligning at curb then using crow of road to adjust
        - Potential issue with skewed APS – some use that to align directionality
    - Suggestion to remove truncated domes in bikeway
- Painted tactile
    - Feels same
    - Less audible feedback compared to cast tactile
- Concrete surface
    - Can feel difference in textures – consider texture in bikeway to help distinguish

Group 2 Notes

Focus/Location: Slightly N of 4th on Hennepin at bus stop - Tactile edge

Bria asks everyone to introduce themselves and share their fav street in mpls:

Bria F, transportation planner working w Katie
fav st - Minnehaha in Longfellow- cyclist and pedestrian

Derek S, ADA engineer for public works - Hennepin county roads – fav road: Franklin

Rick, builds streets and infrastructure for the City - mentions constructability reviews for tactile guide strips, lives in downtown, also a cyclist

Allen, public works - traffic division - something, fav road is Hennepin Ave because of all crazy activity - lifelong resident

Noah, Toole Design, come up with design for First , W River parkway - live in St paul but likes Minnehaha to bike and run

Blind Inc. member/ recent grad shares his fav street is Nicollet

Another Bling Inc. member, Mahjed, shares he doesn't have a fav street since he's from Saudi Arabia but currently lives next to east bank station so appreciates that street.

Blind Inc instructor, Chelsea D, shares fav street is a toss up between Nicollet and Minnehaha

Sara, another one of Blind, Inc instructors, shares Hennepin is fav because she likes complex intersections

Bria clarifies tactile edge verbiage - foot wide, different than truncated domes (goes onto sidewalk and street)

*Tactile is a new(ish) type of feedback so input is needed

Encourages observations and feedback

1st stop) tactile edge

how we use tactile edges?

If these tactile edges are more direction or delineation of space?

Warning or helpful as a guide (to a destination)?

Feedback:

People share that delineation of space especially bike lanes (can be tricky)

*Bria cites inconsistency in tactile edges - asks if the inconsistency makes transportation difficult:

People share different textures would be helpful

Consistency is better for low vision ppl as a whole because everyone has different abilities

Bria restates question: tactile edges used as a warning or if they are used as directional aids?

Sara advises it is more of a **warning** - Chelsea agrees

Sara adds that she does see how it can be directional

Mahjed doesn't like walking on top of tactile edge because what if someone is behind - cites Saudi Arabia had that system but advises against walking on top of tactile strip

However, recent grad/Blind Inc. member shares he walks on top of tactile edge to line up to cross

Chelsea D asks about vibration feature on pedestrian crossing button – current button lacks that feature

2nd stop) Tactile edge is a foot long - raised bumps- more subtle

People mention that subtle tactile edge might not be good for someone with neuropathy

However, Mahjed prefers subtle tactile strip

Bria notes that strip ends abruptly when it comes to planting bed

Chelsea uses cane to identify planters

Preference-tactile following pedestrian side or bikeway?

Chelsea shares that she feels the tactile edge as a delineation aid

Mahjed advises prefers tactile edge to follow the bikeway

Bria asks if tactile edge would make a difference on a one way or two way?
Is it critical to have it next to bike lane no matter what?

Sara shares it's critical to have the tactile edge next to the bike lane/ to follow the bike lane

Planner/Public works rep (Rick or Allen) mentions bike lanes are curvy so asks if that may make a difference – poses question to the group: thoughts about tactile edge following sidewalk instead?

Sara replies saying it would depend on if/how you use the tactile edge (cites: directional or delineation considerations)

We walk back to bus stop

At the intersection, Bria asks for feedback about signals we've been using and/or truncated domes

Chelsea loves the braille signs, would like button to vibrate upon pushing and holding

Bria asks about any unique challenges crossing an intersection with one way travel?
*pause among group - Sara shares there aren't really any specific challenges? (didn't hear clearly)

Planner/Public works person cites Nicollet and mentions lack of curb if going North, South, East or West – people share that it's more important for curbs to be there when traveling East and West* (as opposed to North and South)

Noah asks about curbed edge and mentions bike lane and sidewalk come together it may be hard to delineate - mentions potentially ending up in bike lane?

-Didn't note any particular response to the question-

**We head back towards the library*

At the intersection/cross walk Bria/group note tactile edge with different texture to separate/signal edge of walkway/crosswalk at intersections may be helpful

Derek asks about preference between lateral lines across cross walk or to delineate between bike and ped crosswalk? Edge lines in the street?

Bria notes tactile edge stops right at the utility blocks

Chelsea likes the texture of the more obvious/textured tactile edge

We cross an intersection – Bria notes we just crossed in the bike lane – asks group how noticeable it was to walk across.

People share that they did not know/green bike lane/crossing was **not noticeable.**

Bria asks about ways to align with ped crossing when crossing an intersection.

Sara shares that **aligning with ped crossing button may be challenging especially when in group**

*People note loud crosswalk button can be excessive

Alternatively, Recent grad mentions the button on University and 25th button is really quiet which is not helpful

Adds, that sometimes the extra noise can be startling

Bria asks group now that we are near the library entrance if they can detect the leaf shapes on the sidewalk?

Recent grad shares that he doesn't detect it; just feels like cement

Bria asks for thoughts about preference between rectangular bumps vs large fan around the intersection

Recent grad shares if there is a curb in the right or left – he can line himself up

Bria asks group of 2 about their thoughts about site visit, in general, if it was helpful at all?

Group shared that it was nice to talk about what will be helpful to improve – recent grad noted that the crosswalk button was comically loud

*We arrive at Bus Stop near tactile edges near library entrance

Break in tactile edge due to bus stop - Bria asks how difficult or easy to tell with inconsistency in tactile edges – if they are
directive or vague?

Chelsea shares the break is noticeable but not necessarily indicative of bus stop for her

Chelsea asks if there is a bus pole or shelter - good if there is a shelter or bus pole bc that is a major signal/helpful

Bria asks if there were any changes in directional or delineation considerations after doing the walk/side visit?

Chelsea shares still uses tactile edge as a delineation indicator.

Advises that the **edge should be closer to bike lane** - the foot between bike lane is not necessarily helpful

Sara shares that having the tactile edge as close to bike lane as possible is helpful

Bria asks if color of bike lane is helpful for people with low vision - does contrast make an impact?

Sara shares as much contrast as possible is helpful but could also be distracting

Bria asks about how to tell between tactile edge and grate - Sara notes she could tell by difference in sound

Noah shares tactile edges uses 12in (like the one outside the library) and 6 inch edges - how essential is 12 in?

Chelsea shares 6 in should be enough

Sara shares 12 inches are good to accommodate for more people with varying abilities in the community (ppl with neuropathy, not much familiarity with cane, etc.)

Bria asks, what they wish we knew/anything that people should pay more attention to during this design process?

Chelsea shares universal design considerations are vital – notes that designs that are functional and accessible for all is needed.

Sara shares there is something like too much (in terms of tactile cues, loud crossway button audio feature)

Chelsea notes that at smaller streets/intersections that maybe APS is not needed on every intersection

Sara adds that they do have skills to locate/position themselves, but that APS is helpful in terms of 2 way stops since they can be challenging

Group 3 Notes

Hennepin and 4th intersection:

- This tactile strip is easier to detect than the one east on Marquette – it's much more defined.
- Question: what was the design choice of putting the APS so far back from the crosswalk? "Normally it's nearer to the crosswalk."
- Observation/issue: the trash cans were obstructing the walkway from the crosswalk to the bus stop (west of the bike lane). Staff moved the trash cans so pedestrians could walk without obstruction.
- Put in the "Nice to have" category: definition between the bike and ped lane on the crosswalk (as they cross over Hennepin).
- Observation: can "feel their way down" easily at the crosswalk. This is what people with neuropathy rely on first and foremost.

Library driveway tactile edge on 4th:

- Question: "what is the design purpose of the driveway slope with the tactile edge?"
- Someone liked that the tactile edge in this location is a different texture than the cross walks so they can differentiate.
    - However, people who are newer to this could be confused – and think it's for Waypoint purposes.
- Someone said they are getting used to tactical edges still - "it takes some learning."
- Overall, curbs are preferred to tactile edges – more defined; better understood.

- Question: how long do they last?
- Question: how are they maintained during winter months (snow, ice) so they continue to be effective?
- The biggest concern was if newer students confused it for a cross walk – "they would need training."
- Second biggest concern: How to keep clear in the winter months.
- Overall – the key thing is that nothing is blocking the sidewalk and the separation between sidewalk and bike lane is easy to detect.
    - "Do you have preference?," asked a staff.
        - "It's personal preference."
        - Someone said, "curb." Another person said, "green space."
        - As long as it's easily detectable.

East of Marquette on 4th:

- On the way:
    - Please keep intersection signage – very helpful! (equal access – other people know the names of streets, so should the blind).
    - The crosswalk signal is very loud.
- The tactile edge at this location is ineffective – hard to detect (even for someone who is very sensitive to the feel of things).
    - "This one is not as easy to detect."
    - "It's hard because you don't know what you are looking for."
    - Many participants didn't know where the bike lane was because of this.
- Overwhelmingly people said the other tactile edit nearer to Hennepin was preferred – or a curb was the most preferred because it's the easiest to detect.

8/24/2022 – TED STAFF, TACTILE EDGE INSTALLATION NEEDS

Attendees: Amy Barnstorff, Rick Kreuser, Ayalew Getaneh, Kyle Wallace, Jesse Gese, Steven Lam, Chris DeDene, Stephanie Malmberg

- Intro/overview of evaluation work
- Installation needs/challenges? i.e. space needed, other?
    - 1' vs 6" strip?
        - Min 3" – recommended 6"
- Henn phase 1 – some segments used 2 6" strips combined rather than 12" strip; see more issues with this since there are more areas that can get clipped
    - Plows coming out of driveways have ripped them up in select locations and need to be replaced
        - a few on Hennepin already replaced
    - Plows/bobcats can shave off the top/ridges
- Need 3" away from any cold or expansion joint
- Contractors have to plan out their pours based on spacing from joints, leads to more planning
    - May have to think about where we start laying the plates
- Development of a Standard plate
    - Need to show min' space away from cold/expansion joint
    - Where they can and cannot cut the panels
    - Cut edge should not be beginning or end of run – easier to get caught because it does not have beveled edge, easier for plows to catch
- Don't think we keep these in stock

    - There are supply chain issues so PMs should order this ahead of time
- Color – should this be defined with our design standards?
- Costs
    - From Jesse
        - Contract linear guide strips by ADA Solutions
            - 1618 LF @ $54.50/LF
        - CO #67 Ground surface applied by Vanguard
            - 60 LF @ $115.50/lf (includes prime 10%)
- Photos: https://photos.app.goo.gl/JnWVzQLfwuDEE3bM7