



WESTERN MICHIGAN UNIVERSITY

Enhancing Non-motorized Mobility within Construction Zones

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1. Overview

Managing motorized vehicle and providing safe routes for non-motorized mobility due to construction work zone is becoming a challenge for urban, rural, and congested cities. Sometimes sidewalks/shoulders/bike lanes/and motorized vehicle lanes are taken to provide space managing construction activities. This leads to increase congestion, delay, and safety issue for different road users. Besides, construction work zone impairs access to local businesses, bus stops, near by facilities, etc.; and mobility of pedestrians, cyclists and emergency crew. On the other hand, emergency response teams need the fastest access to a location/facility. During a construction work, most of the time, highway or city official provides temporary traffic control (TTC) management plan to manage motorized vehicles. TTC management plan includes accommodating motorized vehicles within construction zone with reduced speed limit and safety cautions or detouring via designated routes. Detouring motorized vehicles increases the vehicle operating cost, value of time cost, accident rate, and environmental pollution. Less attention is paid to managing non-motorized mobility; hence, managing non-motorized mobility becomes contractors' responsibility. Due to lack of policies and guidelines provided to the contractors, they are not bound to provide facilities for managing non-motorized mobility. For this reason, sidewalks and streets are completely closed without providing alternate routes within or around construction zones. As a result, safety and accessibility of the pedestrians and cyclists are compromised.

The safety and accessibility of pedestrians and cyclists can be ensured if (a) the cities have policies for managing non-motorized access, (b) engineers and planners have a framework to evaluate a site for developing alternatives and guidelines to accommodate non-motorized traffic, and (c) contractors have access to means and methods of implementing the guidelines. Most of the construction activities in small cities are handled by small contractors who do not have a large workforce to do research to identify the latest technology for managing construction activities and providing facilities for non-motorized mobility. Hence, the guidelines for managing non-motorized access provided with a project award need to include a manual with technologies and infrastructure that the contractors can use to implement the guidelines. Thus, a research project was initiated to synthesize policies, guidelines, and technology and infrastructure necessary for managing non-motorized traffic within or around construction zones. Another objective is to document best practices and develop a framework that highway agencies and city officials can use as a planning tool. When implementing the selected management plan, synthesized list of technologies and infrastructure can be used to address the constraints for managing non-motorized traffic.

2. Space Management for Construction

To acquire necessary space for managing construction activities, a sidewalk, shoulder, bike lane, motorized vehicle lane, or a combination thereof is closed. Roadway features that are affected by construction activities are listed in Table 1.

Table 1: Roadway Features Affected by Construction Activities

Affected Roadway Feature(s)
Traffic lane(s) - TL
Sidewalk - SW
Sidewalk and bike lane - SWBL
Sidewalk, bike lane, and traffic lane(s) – SWBLTL
Complete closure - CC

The following list provides alternatives for managing non-motorized mobility during construction activities when one or more roadway features are closed:

- a) 4 ft tall fence
- b) Temporary crosswalk
- c) Covered pathway
- d) Pathway on extended bike lane
- e) Pathway on traffic lane
- f) Temporary pathway
- g) Detour

3. Alternatives for Managing Non-motorized Mobility

c) Covered Pathway

Adequate space and access to pedestrians and cyclist can be safely provided with covered pathways. Figure 2 is an example from Steglitz City in Germany.



Figure 3: Covered pathways for cyclists and pedestrians

a) 4 ft Tall Fence

When it is required to occupy traffic lane(s) for managing construction activities, motorized traffic is accommodated within the construction zone or detoured via designated route. To ensure safety of non-motorized traffic, a 4 ft tall fence is erected between the work zone and the non-motorized mobility path.

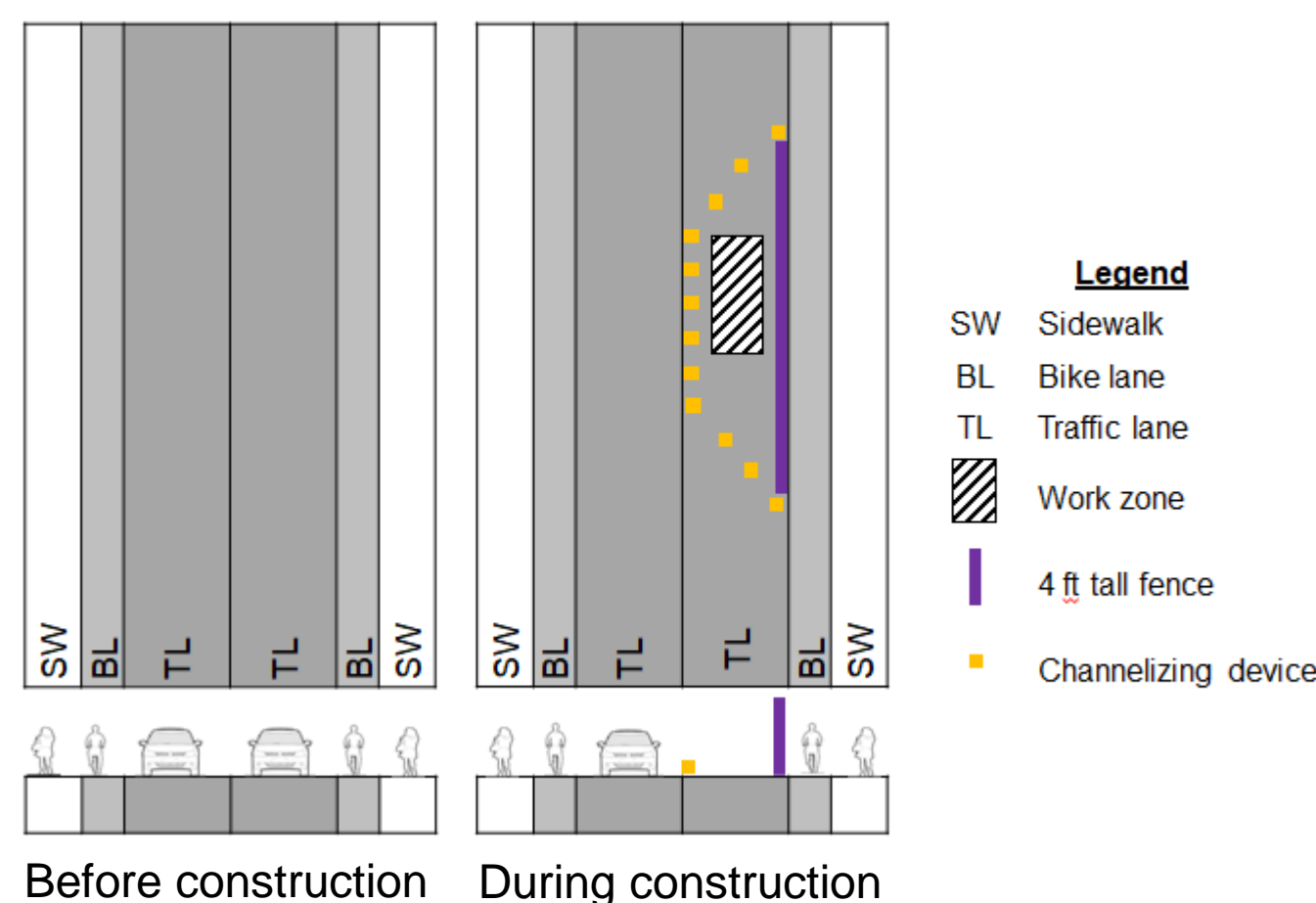


Figure 1: 4 ft tall wall between work zone and bike lane

b) Temporary Crosswalk

When a work zone is located at a corner of an intersection or mid-block, temporary crosswalks can be provided before the beginning of the work zone. This type of solution can be adopted at any phase of the construction. Temporary traffic control devices can be incorporated for managing traffic.

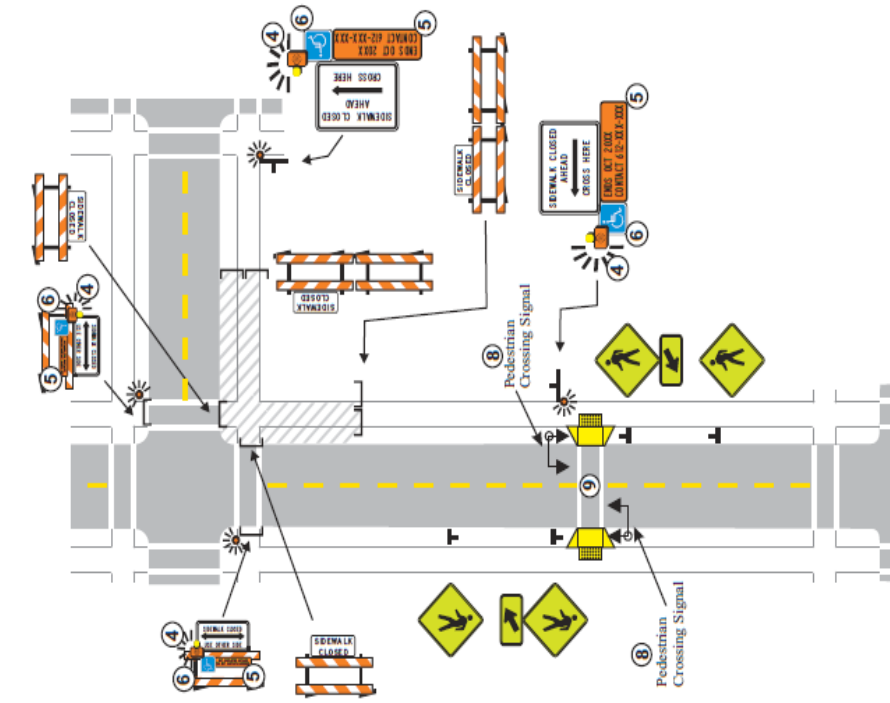


Figure 2: Temporary crosswalk (Source: Minnesota DOT)

f) Temporary Pathway

Temporary pathway can be provided, when space is available by the side of the road.

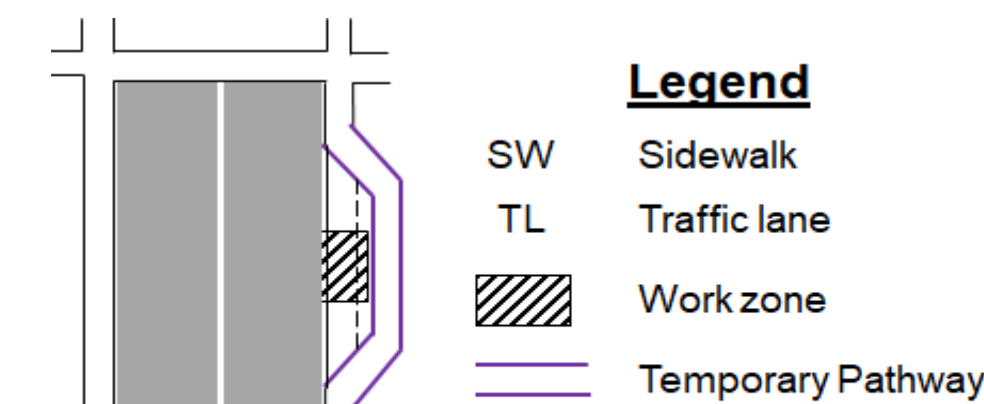


Figure 6: Temporary pathway

e) Pathway on Traffic Lane

When only side walk is available, a 4 ft wide pathway can be provided on a traffic lane by taking two 2 ft wide strip from 2 adjacent traffic lanes as width of traffic lane can be reduced to 9-11 ft if posted speed of road is up to 65 mph.

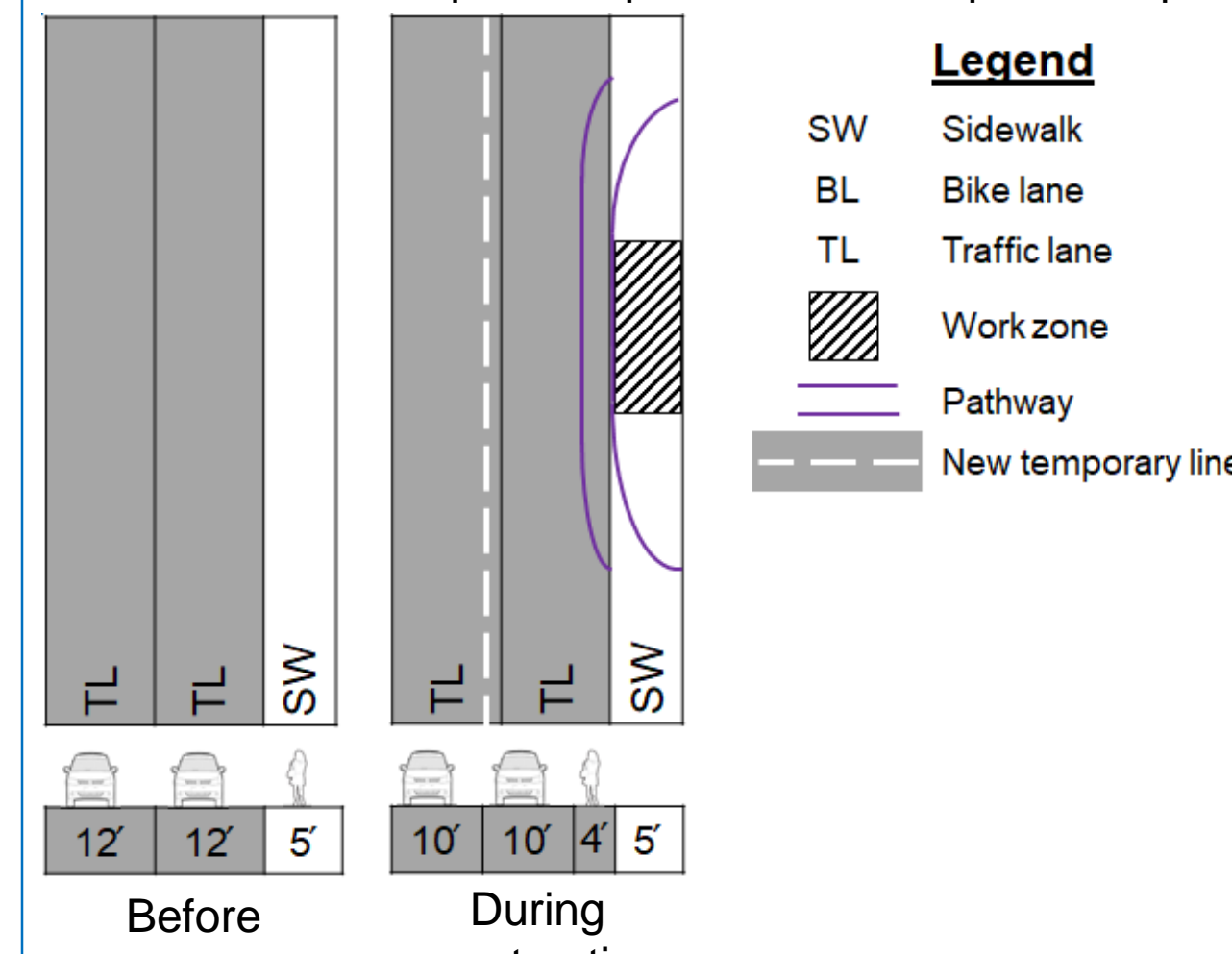


Figure 5: Pathway on a traffic lane

d) Pathway on Extended Bike Lane

When only sidewalk is taken for construction activities, bicycle lane is extended to accommodate pedestrians as well as cyclists. To provide access, non-motorized mobility can be accommodated on extended bike lane. As an example, if a 4 ft wide bike lane is available, a 2 ft wide strip can be taken from adjacent traffic lane to have a 6 ft wide extended bike lane. The minimum width of providing a pathway for pedestrian and cyclist is 4-6 ft.

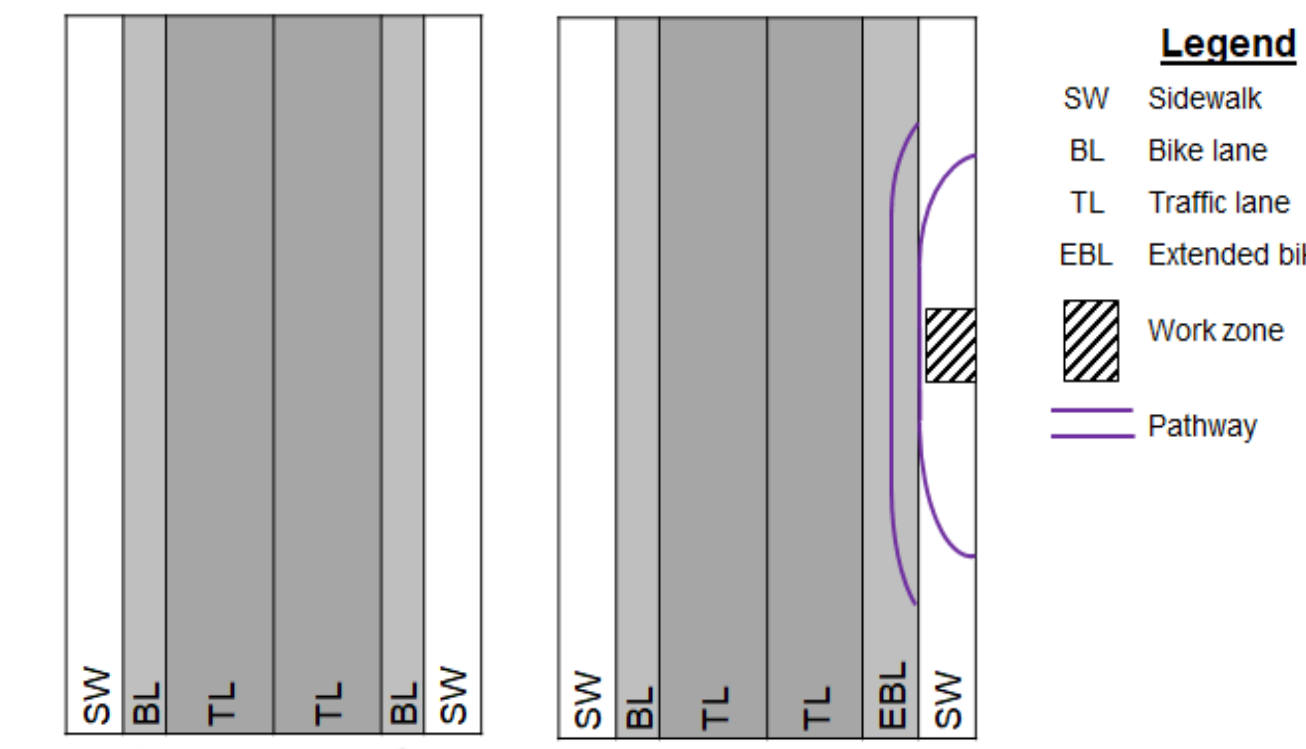


Figure 4: Pathway on extended bike lane

Typical Layout and Signage

Typical layout and signage presented in figure 7 can be adopted when temporary pathway to be provided to ensure access to non-motorized mobility.

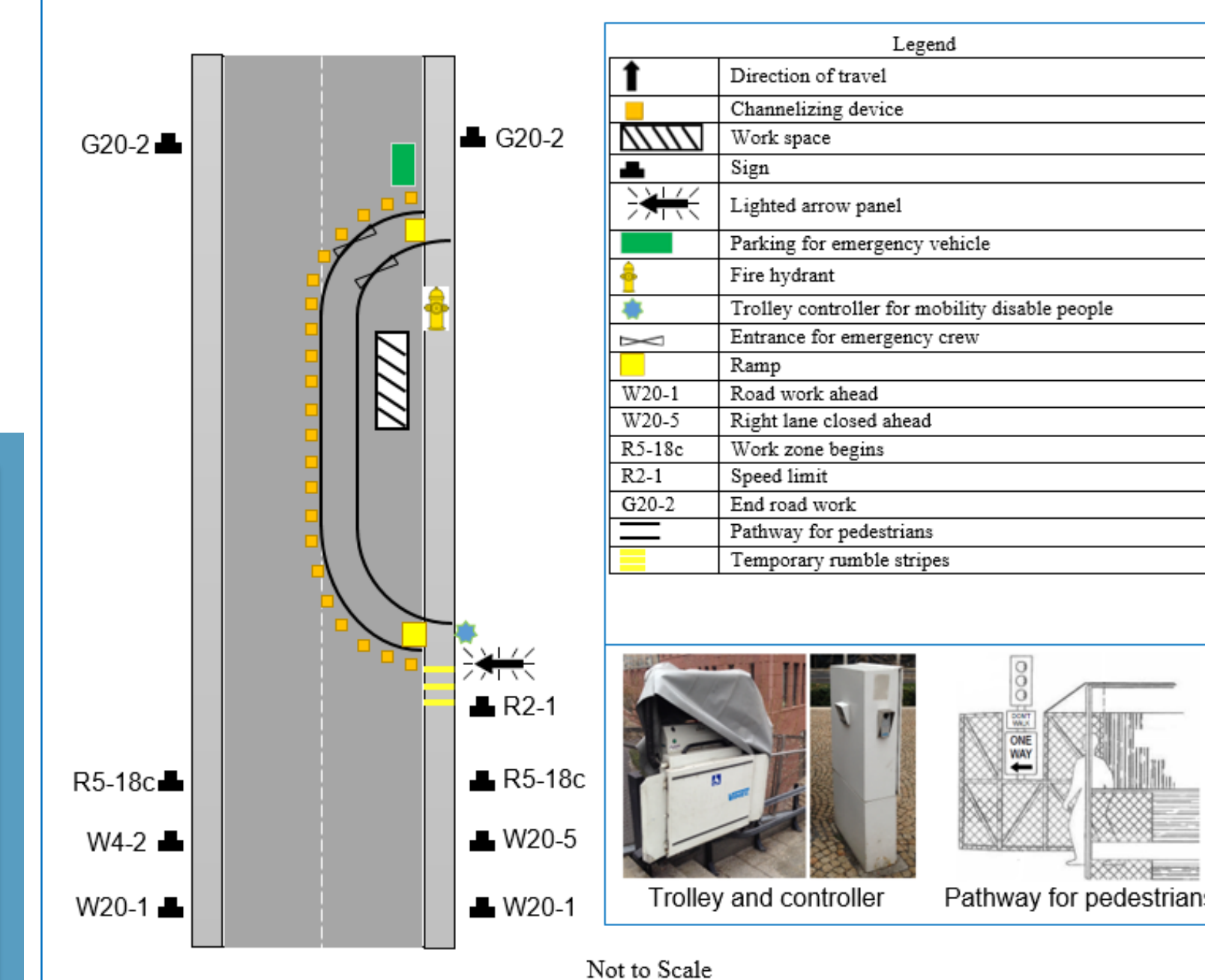


Figure 7: Typical layout and signage

4. Alternative Selection Criteria

Selection criteria of alternatives for managing non-motorized mobility during construction activities are presented in table 2. Alternative can be selected for different closure of roadway features, construction activities, position (corner or mid-block) of work zone. While selecting the alternative for specific construction location, position, and construction activity, preference should be given to those alternatives which can be provided with minimum inconvenience to non-motorized mobility. As an example, temporary crosswalk can be chosen for construction work zone that requires closure of sidewalk and bike lane for all activities of construction.

Table 2: Alternative Selection Criteria

Alternative	TL	SW	SWBL	SWBLTL	CC
4 ft tall fence	Demolition	Demolition	Demolition	Demolition	Demolition
Temporary crosswalk	Possible solution	Possible solution	Possible solution	Possible solution	Possible solution
Scaffolding covered pathway	Demolition	Demolition	Demolition	Demolition	Demolition
Pathway on extended bike lane	Possible solution	Possible solution	Possible solution	Possible solution	Possible solution
Pathway on traffic lane	Possible solution	Possible solution	Possible solution	Possible solution	Possible solution
Temporary pathway	Possible solution	Possible solution	Possible solution	Possible solution	Possible solution
Detour	Demolition	Demolition	Demolition	Demolition	Demolition

Legend

- Possible solution
- Demolition
- Other construction activities
- Work zone at mid-block
- Work zone at corner

Preference

5. Future Research

- Identify quantitative and qualitative parameters and associated data for developing a framework for selecting alternatives to enhance non-motorized mobility within and around construction zone.
- Synthesize technologies and for enhancing non-motorized mobility.

References

- ADAAG (2002) <http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background/adaag#4.5> (September 24, 2017).
- Datta, T., Savolainen, P., McAvoy, D., Gates, T., Kay, J., Nicita, N., and Parajuli, S. (2016). A Guide to Urban Work Zone Temporary Traffic Control (2016). Wayne State University.
- MUTCD (2009). U.S. Department of Transportation. Federal Highway Administration.

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