

14.6 Temporary Traffic Stripes and Traffic Markings

Department Policy on Traffic Stripes and Traffic Markings is as follows:

1. Placement of permanent stripes (TRAFFIC STRIPES) and permanent markings (TRAFFIC MARKINGS) may be delayed for up to 14 days after paving. Temporary pavement markers shall be used to delineate center and lane lines on newly paved sections of roadways that need to be opened to traffic prior to the placement of TRAFFIC STRIPES.
2. TEMPORARY TRAFFIC STRIPES and TEMPORARY TRAFFIC MARKINGS shall be used when traffic stripes or traffic markings are required on intermediate pavement layers that need to be opened to traffic due to stage construction and shall not be in place for more than 14 days. The traffic stripes shall be calculated in linear feet for each 4-inch width of actual stripe (gaps are not counted) under the item TEMPORARY TRAFFIC STRIPES. Chevrons, crosswalks, and stop lines shall be calculated in linear feet for each 4 inch width of actual stripe under the item TEMPORARY TRAFFIC STRIPES. Words, arrows and other pavement symbols shall be calculated in square feet under the item TEMPORARY TRAFFIC MARKINGS.

Temporary pavement marking tape and temporary pavement markers shall be specified when lane shifts are necessary on existing pavements not being repaved. The placement of temporary pavement markers shall be in accordance with the Construction Details. However, the designer shall specify TRAFFIC STRIPES and TRAFFIC MARKINGS rather than temporary pavement marking tape and temporary pavement markers when the usage of the placed material would extend beyond December 21st.

When traffic stripes/markings are removed to accommodate stage construction, the removal process invariably mars the final surface. Marring is allowable on intermediate layers, however, the final surface course must not be marred. Designers are to design the project in such a way as to ensure the final surface course does not require temporary traffic stripes or markings to be removed, or develop additional quantities for milling and paving of the final surface course marred by the removal of traffic stripes or markings.

3. TRAFFIC STRIPES or TRAFFIC MARKINGS may be considered for stage construction, detours, and diversionary roads on those occasions when it can be justified based on cost considerations, site conditions, or length of time when the stripes or markings will be in place. It is important to estimate the length of striping based on all of the above factors of a project.

14.7 Lane and Roadway Closures

14.7.1 Lane Closures

Designers should modify standard sheet TCD-1 to provide a table showing specific restrictions placed on travel lanes, durations of closures and hours when work may be performed, including holidays and weekends. The closures and lane restrictions shall be evaluated in the Traffic Impact Report (see Section 14.4) and approved by the Regional Traffic Operations and Local Authorities. The following table is provided as an example of the form of presentation of this information:

Roadway Route Designation and Direction	Type of Closure	Monday thru Thursday	Friday	Saturday	Sunday
	No Closure				
	One Lane Closure				
	Two Lane Closures				
	Full Closures (indicate duration and type of operation)				

14.7.2 Total Roadway Closures

Total roadway closures (i.e. all lanes, single direction or two directions) required for the erection of overhead sign structures, cantilevered sign structures or bridge steel shall be performed in accordance with the following:

- The use of total roadway closures shall be specifically addressed in the Traffic Impact Report (see Section 14.4) and shall be considered only after detours have been determined to be unavailable or infeasible.
- Closures shall be approved by the Regional Traffic Operations and Local Authorities.
- Closures shall be performed during non-peak hours and with prior approval of the Engineer concerning the timing and method of operation.
- The application of nighttime operation of the closure shall be considered (see Section 14.10).
- The erection of overhead and cantilever sign support structures shall be done when the overhead electric lines have been de-energized.
- Closures shall be initiated with a slowdown of traffic 1/2 mile in advance of the work area. The slowdown shall be accomplished with the assistance of Traffic Direction, Police.
- Closures, whether single direction or two directions, shall be limited to 15 minute intervals. At the end of each 15 minute interval the work must stop, the span must be secured and traffic allowed to pass. After traffic has cleared, the roadway may again be closed for another maximum 15 minute interval (following the procedures in this section) and work may resume. Continue this procedure until all work over the roadway is complete.

Where the TL TWO is used, the TCP shall include the above provisions for the separation of opposing traffic except:

- A. Transition Zones - Positive Barrier (Pre-cast Concrete Construction Barrier Curb or approved alternate).
- B. Between Transitions - Positive Barrier, as described in A above or by delineation devices, such as drums, cones or vertical panels, as deemed appropriate by the Design Unit and with the concurrence of the Bureau of Traffic Signal and Safety Engineering.
- C. Striping and complimentary signing shall be used in conjunction with A and B above.

Distance from the Traveled Way: An obstruction within the clear zone may warrant a construction barrier. The clear zone is the area, starting at the edge of the traveled way, available for safe use by errant vehicles. See Section 8.2.3, "Clear Zone", on directions on how to determine if an obstruction is within the clear zone.

Duration of Existence: A construction barrier may be warranted if an obstruction will remain within the clear zone for more than one work shift.

14.8.3 Applications

Construction Barrier Curb, is shown on Construction Detail Sheets CD-159-3, CD-159-4 and CD-159-5. Alternate A can be pinned to the roadway, and Alternate B has pockets to receive 1 inch diameter anchor bolts as well as pin holes.

There are three types of connections. Connection Type A should only be used at those locations where an allowable movement of the barrier, when hit, of 41 inches is acceptable. When the maximum allowable movement is 28 inches, connection Type B should be used. When the maximum allowable movement is 11 inches, connection Type C should be used. The connection type to be used at specific locations should be indicated on the Traffic Control and Staging Plans.

Connection Type B uses a box beam bolted onto the construction side of the barrier to help reduce deflections. Refer to Construction Detail sheet CD-159-3. The box beam side cannot be placed adjacent to traffic due to the potential snag hazard.

Construction Barrier Curb stiffened with box beams shall be installed at least 50 feet prior to, be continuous through, and extend at least 50 feet beyond the area requiring limited deflection. Show limits on Traffic Control Plans.

There is an optional Connection Type B treatment at vertical drop off (edge of bridge, edge of vertical cut, etc.) shown in Standard Traffic Control Detail TCD-2. It allows for the barrier to extend over the edge of a vertical drop off after it is hit. For Connection Type B, according to the crash test, the center of gravity (centroid) of the barrier sections was deflected beyond the edge of the vertical drop off. However, its connection to the other sections prevented it from falling off. Therefore, barrier with Connection Type B may be placed a minimum 12 inches from the edge of the vertical drop off, provided there is at least 28" of clear space beyond the barrier. For example, if the outside edge of the barrier was placed 12 inches from the edge of the bridge drop off, the bridge area behind the barrier (12 inches) plus an additional 16 inches (28" - 12") past the drop off must be clear of all obstructions (utility poles, scaffolding, equipment, materials, etc.) or people. The optional Connection Type B treatment at vertical drop off will be used where there is not enough room to allow all of the maximum allowable movement in front of the vertical drop off and detours are

not feasible. Reduce lane widths and shoulder widths to the minimum allowed during the construction stage in question, prior to considering the optional connection treatment.

The following chart summarizes the respective connections:

Connection Type	Use	Connections
A	Maximum allowable deflection of 41 inches	Connection Key, and barrier end sections fully pinned*
B	Maximum allowable deflection of 28 inches (Cannot be used with traffic on both sides of the barrier.)	Connection Key, 6" by 6" box beam, and barrier end sections fully pinned*
C	Maximum allowable deflection of 11 inches	Connection Key, construction side of all sections pinned, and barrier end sections fully pinned*

* Fully Pinned: pins in every anchor recess on both sides. End Sections: The first and last barrier piece of the entire run regardless of connection type.

Pinning barriers to a new bridge deck is undesirable. Pinning barrier to a bridge deck that has an existing LMC overlay undermines the effectiveness of the LMC. In addition, the extra costs associated with placement of LMC make it especially undesirable to lessen its effectiveness by drilling holes through it. Designers are advised to investigate alternatives in order to eliminate the need for pinned barrier on bridge decks where possible so as not to compromise the benefits of the LMC overlay. As an example, if sufficient additional lateral room can be gained, this will eliminate the need for a pinned Construction Barrier Curb.

Construction Barrier Curb shall not be installed on side slopes steeper than 10H:1V. The approach end shall either be flared at 8:1 beyond the clear distance or, when terminated within the clear zone, the approach end of the barrier shall be shielded. See Section 9 for design of inertial barriers or temporary compressive crash cushions.

The minimum functional length of Construction Barrier is 100 feet. Construction Barrier Curb comes in units of 20 feet length, however, other lengths may be used to meet field conditions, see nominal lengths in the Standard Construction Details. The approach length of need (L.O.N.) is the minimum length of construction barrier required in front of the warranting obstruction to shield the hazard effectively. See Figure 14-A for instructions on how to determine the L.O.N. of a Construction Barrier Curb.

Approved safety end treatments for Inertial Barriers and temporary compressive barriers see Section 9. Where possible, the barriers may be tucked behind conventional concrete barrier curb. See Section 9 for construction detail requirements for Inertial Barriers and temporary compressive crash cushions.

14.10 Nighttime Construction

In keeping with the Department's mission of delivering a safe, reliable and affordable transportation system and to alleviate traffic congestion and improve air quality, it is proposed that any activity that requires the temporary closing of traffic lanes which results in a sufficient degradation of the highway level of service, should be performed at night provided that certain conditions outlined below are met. Excluded will be emergency operations such as: locations where safety conditions preclude nighttime work; locations where existing municipal ordinances have been enacted that prohibit nighttime work; or locations where the traffic volumes are such that the work activity can be accomplished during the day without significant negative impacts.

It is the intent of the Department to perform construction activities at night that would otherwise cause unacceptable negative impact on traffic flow. It is recognized that there are certain influencing factors that must be reviewed when considering whether or not to perform nighttime work.

The decision to perform nighttime work will be determined during the scoping process but the final approval for nighttime construction should be made by the Department's Project Manager. The following guidelines are to be used for establishing the warrants for nighttime work.

1. The conditions listed below must be met before nighttime work can be performed:
 - Compliance with local noise restriction ordinances.
 - Office of Community Relations has obtained local government approval for nighttime work within the project limits. (Inform local government of what type of work will be taking place.)
 - Work zone safety must not be compromised by nighttime construction activities.
 - The quality of construction work must not be compromised by nighttime work.
2. Some factors that may eliminate the need for nighttime work:
 - A shoulder which may be used in place of the lane to be closed.
 - A viable detour is available.
 - Traffic Operations staff and the Traffic Impact Report indicate that a lane closure during the day would not cause a significant impact.
3. Projects which may require both day and nighttime construction operations are as follows:
 - Projects where the location has specific seasonal requirements (such as shore routes during the summer, major shopping centers at the Holiday Season).
 - Projects where the work required has specific temperature or environmental constraints.
 - Projects with accelerated construction schedules.

14.11 Construction Details

Construction details should be provided for any traffic control device not adequately covered by the Standard Roadway Construction Details.

14.11.1 Crash Cushions

Crash cushions in construction zones shall not be placed on side slopes steeper than 5%, or on islands, curbs, platforms, etc. greater than 4 inches in height. Designers should refer to Section 9 - Crash Cushions for information on the design of the temporary compressive barrier crash cushions and Inertial Barrier systems. The designer must provide design specific information such as the required number of bays or modules for each location. For Inertial Barrier systems, a layout of the modules including the weight of each module shall be included as a construction detail in the contract plans.

14.11.2 Signs

1. General

- Any construction sign not depicted on the Standard Roadway Construction Details should be shown in detail.
- "Trail blazers" should be sized relative to the posted speed limit (i.e. use 4 by 3 feet for posted speeds greater than 40 mph).
- Determine if specific site conditions require special supplemental signing. The use of variable message boards should be considered and approved by Regional Traffic Operations.

2. W99-2 Signs

All projects should include provisions for construction signs with the legend "GIVE US A BRAKE - SLOW DOWN". These signs should be designated as W99-2 and should be 4 by 4 feet. The following guidelines should be used for determination of location and quantity of W99-2 signs:

- Signs will be located 200 feet in advance of the project, one sign for each direction of traffic flow.
- Signs will be installed on existing highways within the scope of the project.
- Signs are to be installed in accordance with the Standard Detail for Construction Signs.

The W99-2 signs are now eligible for Federal-aid funding participation.

3. Construction Identification Signs

Construction Identification Signs should be included in all projects. The following guidelines should be used to determine the location and quantity of Construction Identification Signs:

- Signs are to be located in advance of the project, one sign for each direction of traffic flow.
- Signs are to be installed on major existing intersecting highways within the limits of the project.

4. Tables for Construction Signs

utility relocations that affect the staging of construction should be clearly identified within the sequence of work.

10. When temporary pavement areas are required, a typical section should be provided.
11. Prepare and include in the Traffic Control Plans the method of removal of surface water runoff during each stage of construction.
12. Review the construction staging to determine any seasonal constraints due to weather (i.e. snow removal etc.).
13. Determine the constructability of the construction staging by reviewing the sequencing of work and methods of construction.
14. When staging the successive passes of resurfacing, consideration should be given to the location of the longitudinal pavement edge. Designers should avoid placement of these edges within the wheel path.
15. Determine if underground work (i.e. new storm drains, pipelines, gas, electric, etc.) is sequenced to coincide with or enhance construction phasing, and that this work will meet traffic control constraints for lanes, etc. (i.e. check limits on applying a back slope in trenches when calculating lateral clearances. Also check if sheeting or a trench box will be required. Standard segment lengths of pipe should also be considered.)
16. If required, prepare temporary or interim traffic signal plans, details and traffic signal timing plans associated with the staged reconstruction of existing traffic signals
17. Prepare construction details for any traffic control device not adequately covered in the Standard Roadway Construction Details such as the following:
 - Details for all Inertial barriers and temporary compressive crash cushions as per the construction detail requirements in Section 9 to be utilized on the project.
 - Construction signs not depicted in the Standard Roadway Construction Details.
18. Prepare and include in the Traffic Control Plans, a tabulation of the channelization devices needed for the project.
19. Obtain Traffic and Parking restriction ordinances approved by municipalities.
20. Establish a maximum length of lane closure, length of alternating traffic and maximum number of intersections affected.

14.16 Quality Control Checklist for Designers

Designers shall review the following checklist throughout the development of the Traffic Control Plans. Explanations are required for all "No's" checked.

Design / Quality Control	YES	NO
General		
Stage construction is required for the project and the proposed staging is constructible.		
A Traffic Impact Report was prepared.		
Warrants for nighttime construction have been evaluated.		
Nighttime construction is warranted and has been approved by the Department's Project Manager for use on this project.		
All staging designs and diversionary roads meet NJDOT Design and Construction Standards.		
All work zone pavement markings and traffic control devices meet MUTCD and NJDOT Standards.		
Adequate work zones and transitions are provided.		
Traffic Control Plans provide staging that facilitates construction phasing.		
Traffic Control Plans include NJDOT Standard Traffic Control Details that have been modified based on specific site constraints and construction procedures required to construct the project.		
The Legend and General Notes contained within the NJDOT Standard Traffic Control Details were reviewed, modified and/or expanded to address project specific conditions.		
Where required for clarification, sectional views showing the placement of traffic control devices, such as construction barrier, adjacent to the traveled way and the work site have been provided.		
Construction details for any traffic control device not adequately covered by NJDOT Standard Roadway Construction Details have been provided (i.e. temporary crash cushions).		
A tabulation of the channelization devices needed for the project is provided in the Traffic Control Plans.		
Temporary compressive barrier crash cushions are warranted, fill out summary table in CD-159-9		
Inertial barriers are warranted, include layout of modules, including the weight of each module as a construction detail.		
Appropriate designs, specifications and/or notes are provided for safety during work and non-work periods (i.e. storage of equipment, materials and vehicle parking outside clear zone, use of appropriate channelizing devices, etc.).		
Earthwork phasing is compatible with the actual construction and Traffic Control Plan for the project.		
The project makes appropriate use of the item, Traffic Director, Flagger.		
Emergency facilities for fire, rescue and/or police exist within the project limits.		

Transition areas meet or exceed the minimum standards set forth in the MUTCD.		
Grading for all temporary roadways and cross-overs is shown.		
A maximum length of lane closure, length of alternating traffic and maximum number of intersections affected have been established.		
Pavement		
Temporary overlays or patching are needed for staging.		
Temporary pavement areas are required and a typical section has been provided.		
Full depth shoulder reconstruction is needed for staging operations.		
Existing shoulder can be used to carry traffic for staging operations.		
Distressed areas of existing pavement will require joint repair or bituminous patch.		
Sawing and sealing of joints is required.		
Rutting in the existing pavement will require special milling treatments to achieve new cross slope or typical section.		
Conflicting pavement markings and/or plowable pavement reflectors have to be removed and replaced.		
Access		
Provisions were made for workers, equipment and material deliveries to safely enter/exit work zones.		
Provisions were made for emergency vehicle travel through the detour/road closure/lane closure area.		
Provisions were made for bus routes and bus stops within the detour/road closure/lane closure area.		
Access for local business/residents is provided.		
Freeway closure information is clearly shown in plans.		
Required lanes and closure periods for freeways and local streets, are clearly listed in the plans or special provisions.		
Restrictions on access to site or other sensitive environmental issues were evaluated.		
Areas are available for: stockpiling processed material, form lay down and fabrication yards, equipment parking, temporary field offices, personnel parking, and purchased material storage.		
Temporary sidewalks are required.		
Temporary Barriers / Guide Rail		
Where temporary barrier is required, all staged moves are accounted for.		

The transition lengths for temporary barrier curb or guide rail meet or exceed the minimum design standards.		
Temporary barriers are flared to 30 feet outside roadway edge where ever space permits to reduce the use of sand barrel cushions.		
Approved end treatments have been provided for the ends of the barrier curb, guide rail or bridge parapets.		
A warrant evaluation was conducted regarding the use of the quick change movable barrier system as a cost effective method to safely expedite or improve productivity in the construction work zone and shorten the construction duration.		
Input for the justification of use of a quick change movable barrier system was obtained from Traffic Engineering and Regional Construction.		
A quick change movable barrier system will be used on the project.		
Staging requires guide rail to be extended, removed or upgraded along with appropriate approved end treatments and attachments.		
Staging requires existing guide rail to be reset along with appropriate approved end treatments and attachments.		
Temporary Traffic Signals		
Temporary traffic signals are provided for the proposed stage construction and the design has been certified by a New Jersey licensed professional engineer.		
The Traffic Control Plans for the temporary traffic signal(s), including signal phasing design, signs, pavement markings and timing sequence(s) are complete and presented correctly.		
The traffic signal timing has the minimum change, clearance and pedestrian intervals based on the location and approach speed.		
Existing traffic signals are equipped with an optically controlled emergency vehicle detection system.		
Traffic signal timing provides for pre-emption and clearance cycles when adjacent to RR crossings.		
Utilities / Drainage		
All utility conflicts for the stage construction have been resolved.		
Underground work (new storm drains, pipelines, gas, electric, etc.) is sequenced to coincide with or enhance construction phasing.		
Utility relocations that affect the staging of construction are clearly identified within the appropriate sequence of work.		
Underground utilities are located to meet traffic control constraints for lanes, etc. (i.e. check limits on applying a back slope in trenches when calculating lateral clearances. Also check if sheeting or a trench box will be required. Standard segment lengths of pipe should also be considered.)		
Temporary drainage through the project is provided for specific construction phases.		