WORK ZONE STRATEGIES

Full roadway closure. This strategy involves the complete closure of the roadway during the construction. It necessitates being able to detour traffic adequately onto existing routes. The advantage of this strategy is that it provides for faster construction by allowing the contractor full access to the work area and eliminates exposure of motorists to work zones and workers to traffic. It increases construction efficiencies, eliminates traffic control devices, and reduces overall project duration.

Full closure strategies (off-peak, night, intermittent). These strategies involve complete closure of the roadway for various time periods. Off-peak and night closures require detour routes and other strategies to manage the work zone traffic. For intermittent closures, traffic is stopped for short period(s) (one or both directions). Intermittent closures should be used only on roadways with low volumes or during periods of lower volumes (mid-day, night, weekends, etc.).

Reduce lane width (constriction). This involves reducing the width of one or more lanes to maintain the existing number of lanes on the facility. The width reduction may be less if the shoulder is available for use (width and structural adequacy). However, reduced lane widths reduce the facility's capacity and usually require lane marking changes.

Lane closure. This type of work zone closes one or more existing traffic lanes. This strategy should be analyzed to determine if significant impacts would result from the loss of capacity.

Reduced shoulder width. This involves reducing the width of the inside and/or outside shoulder for construction purposes.

Shoulder closure. Shoulder closure prevents vehicles from using a shoulder or any portion of the shoulder for its intended legal use. This strategy should be avoided in areas with high incident rates. It may also require provisions for towing disabled vehicles and construction of shoulder pull-outs.

Lane shift to shoulder/median. This strategy involves traffic being diverted onto the shoulder, or a portion of the shoulder, for use as a traffic lane. If the construction period is of long duration, a pavement engineer should determine if the pavement is adequate to support the traffic (consider the percentage of heavy vehicles for this corridor).

One-lane, two-way operation. One lane, two-way traffic control involves using one lane for both directions of traffic. It is usually implemented for short-term projects on bridges or in rural areas over a short distance. This may include the use of flaggers or temporary/portable traffic signals to control traffic and minimize delay and safety concerns.

Two-way traffic operations on one side of divided facility (crossover). Also known as reconstruction by halves, this involves the reconstruction of all lanes in one direction while the opposing lanes share the roadway with traffic in the opposite direction. Shoulders and/or lane constrictions may be used to maintain the number of lanes in each direction. This strategy provides an effective work area, and workers are generally separated from the traffic stream; however, there

is the need for crossovers and positive separation. This strategy should be considered when it can reduce the construction period, safety concerns can be addressed, and there is adequate geometry to allow for crossovers. Standards should be developed and used for this strategy (e.g., crossover lengths, pavement, speeds, and positive separation devices).

Reversible lanes. This strategy involves sharing lane(s) of travel to accommodate peak period traffic flow. It is also known as variable lanes or contra-flow lanes. The direction of travel varies by time of day, or maybe day of week. Some sort of barrier (e.g., movable barrier system) should be used to maintain safety and direct traffic flow. However, the cost of this type of barrier system often limits the use of this strategy.

Ramp closures/relocation. Ramp closure involves closing one or more ramps in or around the work zone (for specific time periods, days of week, or all day). It may be necessary for construction purposes or to improve traffic flow on the mainline. Ramp relocation may be used to maintain accessibility to the freeway and/or local businesses or community. Consideration should be given to additional signage and public information campaigns to forewarn motorists, the potential impact to business and community access, and detour route and information. For safety reasons, adjacent ramps should not be closed at the same time unless absolutely necessary.

Freeway-to-freeway ramp closures. This strategy involves closing one or more freeway-to-freeway interchange connectors over a period of time. It may be necessary to close interchange connectors depending on the design characteristics and right-of-way availability. This type of closure will significantly impact the capacity of the facility, particularly on roadways with high volumes and/or congestion. Construction duration for this strategy can be reduced in conjunction with a design-build contracting approach. Provisions must be made for detouring traffic.

Temporary structures/lanes/shoulders (temporary diversion or runaround). This work zone type involves the use of a temporary roadway for diverting traffic so the structure, roadway, or shoulders can be closed for the project. This type of work zone typically involves significant work preparing the temporary roadway prior to actual construction of the roadway and may involve additional right-of-way or easements. It is recommended that the temporary facility be designed such that capacity and safety impacts are the same as or better than the existing facility.

Construction phasing/staging. The impacts of a work zone on traffic may be limited by staging a project in phases, thus completing portions of a construction project one part at a time.

Work hour restrictions (peak hours, holidays, special events). This involves restricting work hours such that work does not occur during periods of peak travel demand and congestion. Work zone staging and phasing will need to be considered to accommodate periods where a longer construction duration is necessary.

Night work. Work is performed at night (end of evening peak period to beginning or morning peak period) to minimize the work zone impacts on motorists. Night work may occur during specific phases of the project or for the entire project duration. Night work has increased because of the need to maintain roads operating at or near capacity during the day. Safety issues may be of concern for night work as motorists' driving skills are typically impaired (e.g., lighting distractions, reduced perception, excessive travel speeds through the work zone). In addition, it is more difficult for contractors to get resources and labor for night work.

Weekend work. Construction work (all or phases) is restricted to weekends, i.e., the period from the end of the Friday afternoon peak period to the beginning of the Monday morning peak period.

Traffic screens. Also known as glare or gawk screens, traffic screens consist of vertical panels that are attached on top of concrete barriers to minimize glare from opposing traffic and prevent motorists from viewing the construction activity. This is intended to be used to minimize rubbernecking delays and increase the safety of motorists and highway construction workers.

Signage. Signage should accurately describe the situation in and around the work zone. The content of the signs should reflect what action should be taken by motorists and provide relevant and current information. Advance warning signs need to be spaced accurately to allow for motorists' action.

Construction signs. Advance signing should be used to notify the motoring public of the work zone and/or offer options for alternative routes. Signs should include dates and/or locations of construction and/or closures.

Detour signs. Detour signs should clearly direct motorists onto detour routes, through the detour, and back to the route from which they were detoured. Advance notice is required so that the motorists have time to choose an alternate route.

Traffic control officers. This involves the use of traffic control officers to direct traffic. It is most often used at heavily congested intersections or during special events, typically for a short duration.

Flaggers. Flaggers are persons who control traffic and assign right of way at approaches to work zones. They slow traffic to ensure the safety of the construction workers and motorists. Flaggers should be used only after all other suitable methods of traffic control are considered and should be limited to rural, low-volume roadways. Flaggers should be clearly visible to approaching traffic and located far enough upstream so that motorists will have time to respond.

Flashing arrow signs. These signs consist of a message board with a flashing arrow and are intended to aid motorists in navigating and merging through and around the work zone. They are particularly effective in alerting motorists of lane closures and/or the need to change lanes. They are intended to supplement conventional traffic control devices.

Detours. This strategy involves re-routing traffic to other roadways and should be considered with total closure of the roadway or where capacity is significantly reduced (one or both directions). Attempts should be made to synchronize the detour route with the beginning and end of construction. Facilities with large volumes should be detoured to other major routes (if feasible), whereas local route detours can generally be used for four-lane facilities. In either case, improvements may be necessary to accommodate the diverted traffic on the detour routes. Some of the factors that should be considered include available capacity, geometrics, detour route speeds, pedestrian concerns, rail crossings, and oversize/overweight/over height vehicle concerns.

Capacity/geometric improvements. Improvements to the detour route may be necessary to accommodate the diverted traffic from the roadway impacted by the work zone. These may include

improvements to the mainline and/or intersections, including roadway and/or shoulder widening, and additional through and/or turn lanes.

Signal timing/coordination. This involves retiming or coordinating (interconnecting) traffic signals to increase the capacity of the roadway and improve traffic flow.

Signing and striping enhancements. Signs and/or striping enhancements are provided to guide motorists through the detour route.

Parking restrictions. This strategy involves eliminating parking on the facility or instituting parking restrictions by time of day and/or day of week. The objectives can be either to use the parking area as an additional lane, increase capacity, or reduce traffic conflicts. Availability of parking for local businesses will need to be addressed, as well as the need to improve intersection geometrics to accommodate an additional lane.

Changeable/dynamic/variable message signs (CMS/DMS/VMS). CMS/DMS/VMS are message boards placed along roadways (typically freeways) that notify travelers of incidents, travel time information, construction/road closures, and other potential hazards in or around the work zone. Careful placement of the roadway equipment provides the information at points where drivers have recourse and can adjust their routes to account for the information. These message signs should be used when the condition of the work zone is changing and where a static sign is not sufficient to provide the information to motorists.

Pedestrian/bicycle access improvements. This strategy involves improvements for pedestrians and/or bicyclists where the work zone impacts their accessibility. They may include physical separation of pedestrians and vehicles, temporary or permanent sidewalks or bike lanes, protection from drop-off locations, temporary or permanent lighting, and/or signal adjustments. Pedestrians/bicyclists should be directed to a safe location if walkways and paths cannot be provided. Special pedestrian/bicyclist considerations may be needed in locations where sidewalks traverse the work zone, where a school route traverses the work zone, where there is significant pedestrian/bicyclist activity, or where existing land use generates such activity (e.g., parks, schools, shopping).

Business access improvements. Some projects will have a direct impact on businesses, particularly accessibility. Accessibility improvements for businesses may include signage or information to direct motorists to the business(es) and/or relocation of access locations.

Innovative construction techniques (e.g., pre-cast members, rapid cure materials). These strategies involve the use of special materials such as quick curing concrete or pre-cast items (e.g., culverts) to minimize the duration of the work zone or where traffic restrictions need to be minimized (e.g., roadways with high volumes).

Design-build. This strategy involves the use of one contractor to design and build the project. This decreases the project duration by allowing construction to begin prior to design completion. The results are reduced administrative costs; a single point of contact for design and construction issues; and flexibility for innovative designs, materials, and construction techniques.

A+B bidding. A+B bidding can be used to encourage contractors to minimize construction impacts by reducing the exposure time. This method is used to determine the winning bid, not actual payments to the contractor. Part A refers to the contractor's estimated cost of the work, and Part B refers to the total dollar amount based on a set user or agency cost per day times the number of days proposed by the contractor to complete the work.

No excuse bonus clauses. This strategy provides for a clause in the contract that awards the contractor a cash bonus for finishing the project or a significant item in the contract by a specified date. No excuses or outside impacts by weather, utilities, right of way, other contractors, unknown conditions, etc., are allowed that would change the set date. This strategy is particularly effective on projects that have utilities or right-of-way problems not cleared by the time work begins.

Incentive/disincentive clauses. This strategy involves the use of incentives and/or disincentives in the construction contract to minimize construction duration (e.g., additional funds may be paid to the contractor if the project is completed early or the contractor may be penalized if late). Incentive/disincentive provisions should be considered for projects that: have high traffic volumes; significantly impact traffic flow, businesses, and/or the community; replace a facility out of service (e.g., bridge or roadway damaged by a disaster); or have detours that are significant in length.

Milestones. This strategy sets milestones for different phases of a project to be complete to provide for earlier opening of a section of roadway or a bridge to traffic. Usually, incentive/disincentive or bonus clauses are added to give more emphasis to the milestone.

Lane rental. Lane rental involves a charge that is assessed to the contractor when a portion of the roadway is obstructed. The charge can vary according to time of day, day of week, number of lanes impacted, and duration. Contractors include in their bid an estimate to accommodate the number of hours they expect to keep a particular number of lane-miles closed. The contractor can make or lose money depending on how the actual number of lane miles involved compares to the bid.

Disincentives for lane closures. Under this strategy the contractor is penalized a specified amount for each quarter hour or other time period increment that he or she has not opened a lane or roadway to traffic during peak period rush hours. The penalty is usually very high and is generally based on road user costs. It is effective in ensuring that his or her work operations are complete prior to rush hour.

Severe weather conditions. Severe weather information systems can be used to alert motorists of potential weather conditions to improve safety conditions through the work zone. However, because of increased difficulty in vehicle control and distraction and/or anxiety for road users during severe inclement weather, work on the project should be postponed, if possible, until the weather conditions improve. Planned work zone management strategies for the project should continue if inaction would be worse than allowing the work zone to be unattended.

Transit service improvements. Where appropriate, transit service improvements may include the modification of transit schedules and/or routes, increases in frequency, or the establishment of transit service in the corridor. This strategy should be considered only in areas where transit use is likely.

Reduced fares. Payments are made to a transit provider to subsidize fare costs to encourage increased rider ship during the period of construction to reduce vehicles through the project.

Transit incentives. Transit incentives include employer transit subsidies and guaranteed ride home programs. These strategies work best when there are adequate transit routes and frequencies that serve major origins and destinations of motorists through the work zone.

Ridesharing/carpooling incentives. This strategy involves the use of rideshare/carpool incentives to reduce the number of vehicles going through a work zone. This could include preferential parking for carpools, the addition of mainline HOV lanes or bypass lanes on ramps, provision of vanpool vehicles, etc. These incentives should be used only in areas where a benefit such as reduced travel time or reduced user costs may be expected.

Park and ride promotion. This strategy involves the creation, expansion, and/or promotion (advertising) of park and ride lots to encourage ridesharing or transit use and reduce the number of vehicles traveling through the work zone.

Shuttle services. Shuttles and charter buses may be considered if a large number of users along the corridor are anticipated to use this service. Users would need to realize a benefit in travel time, parking costs, etc., in order for this strategy to be effective.

HOV lanes. High-occupancy vehicle (HOV) lanes, also known as carpool lanes, require two or more persons per vehicle for use (exceptions may include motorcycles and/or low-emission vehicles). HOV lanes can provide better efficiency for the roadway by moving more people per lane than does a general purpose lane. However, there needs to be a large amount of similar origins and destinations, and/or incentives (park-and-ride lots, preferential parking, time savings, ridesharing match program, etc.), for this strategy to work. HOV lanes could involve using a shoulder, using the median, or dedicating a travel lane for this purpose (likely to be controversial) and can be used during peak periods or for 24 hours/day.

Variable work hours. This strategy involves encouraging motorists who typically travel through the work zone during periods of high demand to work variable hours (off-peak) to reduce the demand for travel during peak periods.

Telecommuting. Telecommuting involves employees working at home, or at a telecommuting center near their home, full time or part time. Motorists who normally travel through the work zone would be encouraged to telecommute during the duration of the project to reduce the demand.

Advance/delay planned projects. This strategy advances or delays projects in the nearby network that are scheduled for construction during the same time that the project will be underway. Advancing the work so that it is complete prior to the beginning of project construction will provide more network capacity or better traffic operations. Delaying the work will prevent traffic impacts on both projects at the same time.

Signal timing/coordination improvements. This involves retiming traffic signals to increase the capacity of the roadway(s) and improve traffic flow.

Street/intersection improvements. Improvements on streets and intersections for the roadway and/or alternate routes may be necessary to handle the traffic through the work zone area. These may include improvements to the mainline and/or intersections such as roadway and/or shoulder widening and additional through and/or turn lanes.

Turn restrictions. This strategy restricts turning movements for driveways and/or intersections and can be implemented during peak periods or all day. Turn restrictions are typically used to increase roadway capacity and reduce potential safety issues.

Separate truck lanes. This strategy involves the construction of new/separate truck lanes, use of one of the existing lanes for only trucks, or conversion of a shoulder or median for truck only use. This should be considered only in areas with a high percentage of trucks, for projects of long duration, and where there is a capacity (e.g., reduced lane widths) and/or safety concern in the work zone with truck movements. Appropriate design and geometric concerns related to trucks would need to be addressed if these were implemented.

Truck/heavy vehicle restrictions. Trucks may be prohibited from using the facility completely by time of day or day of week. Implementing truck restrictions can increase the capacity of the roadway, particularly for facilities with a high percentage of trucks. Availability and sustainability of alternate routes for the trucks must be considered, as well as any state and/or local ordinances that govern truck traffic access.

Ramp metering. Ramp meters are traffic signals located on the freeway on-ramp or on freeway-to-freeway connectors that control the entry of vehicles onto the freeway to maintain safe and smooth freeway operations. Ramp metering can include pre-set timing, traffic-actuated (metering changes based on mainline traffic) metering, or centrally controlled metering and may be used during peak periods or all day. If ramp metering is considered, potential impacts due to ramp queues on local streets should be evaluated.

Temporarily suspend ramp metering. This strategy involves turning off existing ramp meters during specific time periods or for the duration of the project. This strategy may be considered where it is necessary to get traffic onto the freeway quickly (e.g., at the end of a detour route).

Bus turnouts. This involves the construction of bus stop areas that are recessed from the traveled roadway. This strategy should be considered on detour routes or on highway facilities with a high occurrence of bus traffic and stops. This strategy improves traffic flow and delays by minimizing the occurrence of buses blocking the roadway. Bus turnouts should be designed for clear rear vision for safe re-entry into traffic.

Dynamic lane closure system. This system would involve advance warning signs for the lane closure, use of variable-length barriers making up a tapered lane closure system; and a control cabinet to operate the system (e.g., supervisory control PC, radio unit). The objective is to enhance mobility and the safety of highway workers.

Railroad crossings controls. If a rail crossing is located within the work zone and/or on the detour or diversion routes, improvements may need to be considered for safety purposes. These could include advanced warning signs, railroad crossing signs, pavement markings, flashing lights, and

gate arms. The type of control would depend on the level of traffic and what rail crossing controls exist.

Speed limit reduction/variable speed limits. A reduced speed limit may be needed when the work zone may become a traffic hazard or to help protect construction workers. Speed limit changes may be implemented before traffic is detoured, through the work zone, or adjacent to unprotected construction workers. Unfortunately, adherence to speed limit reductions is often poor. To encourage adherence, additional enforcement and/or increased fines (with signage to reflect the increase) may be necessary.

Coordination with adjacent construction site(s). This involves combining or coordinating projects (scheduling) within a specific corridor to minimize the impacts to the motoring public and potentially result in cost savings to the state.

Temporary traffic signals. This involves the installation of temporary traffic signals to improve traffic flow through and near the work zone and/or address safety concerns.

Temporary traffic barrier. A temporary traffic barrier is some sort of a barrier system to separate traffic flow physically from construction workers during the duration of the project. It could range from a narrow bituminous island with delineator tubes to concrete barriers (moderate to long duration). The objective is to provide a physical separation for safety purposes.

Movable traffic barrier systems. This involves a mechanical system to move temporary barriers (e.g., portable concrete barriers) quickly within the work zone. Barrier systems are typically used for reversible lanes and for providing additional space for the contractor to work during off-peak hours.

Crash-cushion (fixed and mobile). Also known as an impact attenuator, a crash cushion is a fixed or mobile device placed at a specific location to prevent an errant vehicle from entering a work zone or crashing into a hazard by gradually decelerating the vehicle to stop or by directing the vehicle away from the hazard.

Temporary rumble strips. Rumble strips are temporary grooves or raised strips placed across a travel lane to alert motorists of the change in roadway conditions or a hazardous curve, slowing condition, or other hazard ahead.

Warning lights. Warning lights include flashing warning lights on barricades or signs to delineate a barrier or warn motorists of the work zone or other conditions ahead.

Construction safety inspectors. This strategy involves having one or more construction safety inspectors on-site.

Project task force/committee. A project task force/committee would be created to address the issue of safety within and near the work zone. The goal would be to identify and recommend actions to improve worker safety without sacrificing motorist safety and mobility.

Team meetings. This involves conducting project team meetings on a regular basis to discuss TMP strategies, implementation, and monitoring, particularly related to safety concerns.

Tow. This strategy involves the use of on-site (or near site) tow trucks to reduce the time an incident (breakdown or accident) affects the work zone. This strategy should be considered in areas where a breakdown or accident will significantly impact traffic flow or safety. Parking areas and turnaround locations for the tow trucks should be provided.

Safety service patrols. These are specific motorist service patrols to assist motorists who are disabled in order to get them on their way to reopen the roadway or shoulder traffic.

Surveillance (CCTV, loop detectors, lasers, probe vehicles). This strategy involves the use of surveillance, also known as monitoring or detector stations, to detect, verify, and respond to incidents in the work zone.

Highway advisory radio (HAR) (fixed and mobile). Longer, more accurate messages than what are available using signage may be necessary for the work zone. HAR involves the dissemination of traffic control information to motorists while en route over wide-area wireless communications directly to the vehicle's radio. Signage will need to be used to inform travelers of the number to obtain the information.

Smart work zone technologies. These are work zone devices and/or systems that use automatic sensors to measure traveler travel time or delay and display this information via PCMAs, HARs, the Internet, and other means in "real-time" conditions.

Statewide Traffic Operations Center (STOC). This strategy involves the use of and coordination with an existing TMC to aid in incident management. If the project is large and of long duration and a TMC does not exist, a TMC may be constructed and operated to help maintain traffic flow and manage incidents. Information, such as traffic data and incident information, can be communicated and shared.

Accident staging/investigation areas. Areas located off the roadway where enforcement officials can complete their accident reports without blocking traffic.

Fender bender signing. This strategy places static signing at various locations along the road indicating to the public that in minor accidents they should move their vehicles out of the roadway and onto the shoulders until enforcement officials arrive so as not to obstruct traffic lanes.

Local detour routes. Identification and approval/authorization of local detour routes in the case of incidents is an important strategy to consider, particularly for high-volume and incident-prone facilities. This would involve identifying possible local detour routes throughout the work zone and obtaining approval or authorization from the local agency for the use of the roadway(s) as a detour route(s) in the event of an incident.

Dedicated (paid) police enforcement. This strategy involves the use of paid police patrols in the work zone. Enforcement in the work zone can be used to deter speeding, provide for removal of vehicles involved in incidents or breakdowns, assist in traffic control, enforce other traffic laws, and prevent intrusions.

Helicopter. This strategy involves the use of aerial surveillance to identify and verify incidents. This is rarely used unless it is available at no or a low cost (e.g., share expenses with a radio station traffic reporter).

Enforcing penalties. This strategy involves the use of enhanced fines for speeding or other violations in traffic work zones (e.g., minimum fines $200in work zones). The intent is to deter speed violation and improve safety through the work zone.

Incident/emergency management coordinator. A person would be dedicated to overall incident and emergency management for the project. Some of the responsibilities might include developing incident and/or emergency response plans, overseeing implementation and monitoring of the work zone transportation management strategies, and managing incidents or emergencies. This strategy should be considered for large projects of long duration.

Incident/emergency response plan. This strategy involves the development of an incident response plan. This plan should include, but not be limited to, roles and responsibilities, response agencies, processes/procedures, actions to take for various incident types and levels, contact information, alternate routes, personnel and equipment information, and staging area locations.

Media briefings. This strategy involves working with the media to provide information for procedures to be used during an actual incident as well as proactive information to help inform the public.

TMP monitor/inspection team. This would require the establishment of a team (or person) to monitor and inspect implementation and monitoring of the work zone transportation management strategies.

Windshield surveys. This involves having a person drive (or walk) through the work zone and conduct an assessment of traffic flow and safety.

Brochures and mailers. Brochures and mailers are printed material containing project-related information such as advanced notice of the project's start date, schedules, pictures/graphics of the project, a description of the need for the project, alternative routes, etc. These may be passed out to motorists at key locations (e.g., large employers in the project area, rest stops, automobile associations, travel information centers) or mailed to affected businesses or communities.

Rideshare promotions. These include creating or marketing an existing rideshare program through signage, advertisements, brochures, and events. The purpose is to encourage ridesharing to reduce the number of vehicles traveling through the work zone.

Press releases/alerts. These involve the provision of project-related information to the news media, affected businesses, and other affected or interested parties. They can include print and/or electronic media and are almost always used to announce the start of a project and, for medium to large projects, to provide updates and report progress.

Paid advertisements (newspaper, radio, television). Paid advertisements announce the coming of a major project and can involve newspaper, radio, television, billboards, etc. Planning is necessary prior to construction of the project for scheduling and developing such advertisements. Paid

advertisements can also be used for progress updates or to provide information regarding major changes to the work zone configuration and management.

Public information center. This is a facility that may be located near the project site that may contain scale model displays, maps, brochures, videos, etc., about the project.

Public meetings/hearings. This strategy involves using project or public relations staff to present project-related information to the public, community, and/or businesses.

Community task forces. This strategy involves the development of community task force(s), which includes various stakeholders from the community that may be impacted by the work zone (businesses, neighborhood groups, interested individuals, public officials, or other representatives). The task force(s) could be developed as early as the planning stage of the project or during construction. The objective is for the group(s) to provide input and review/comment on the construction and management strategies and implementation to minimize the impacts of the project on the community.

Telephone hotline. This traveler information system provides traffic or travel information for the work zone via telephone. It can include static broadcast information and/or real-time interactive request/response information.

Visual information (videos, slides, presentations) for meetings or for web-based dissemination. This involves the use of videos, slides, and presentations to supplement public meetings, public information center displays, or press releases.

Planned lane closure website. This strategy is typically not for one specific project but rather is usually implemented for an entire state, district, or geographic region. It includes a web page that provides planned lane closures of freeways for public information. It should include the routes involved as well as the start and end dates of the lane closure information, both in text and graphical form.

Project website. This traveler information system provides traffic or travel information for the work zone via the web/Internet. It can include static information and/or real-time interactive request/response information.

Coordination with local/cable TV newsrooms, schools and school districts, local major employers/businesses, and local emergency services (fire, police, and ambulance). This strategy involves coordinating with various community and business groups that are likely to be impacted by the work zone. Mechanisms (fax, e-mail, phone message, mailings) can be established to communicate project-related information including start dates, significant changes in the project, project schedule, and occurrences of incidents within the work zone.

Ground-mounted signs. These are signs mounted in the ground with information to guide motorists through the work zone and warn of potential hazards.

Highway information network (web-based). A highway information network is a website where multiple stakeholder groups can place information related to the roadway. The website is shared

among the various stakeholder groups, each with their own data storage areas (including control of functionality, security, data quality, etc.).

Radar speed message sign. A portable system mounted on a sign or located on a portable trailer that uses radar to measure vehicle speed and informs motorists of their speed. A sign with the speed limit for the roadway should be at or near the panel sign to inform motorists of the speed limit. The objective of this system is to enhance safety by reducing vehicle speeds and speed variations.

Traveler information systems (wireless, handhelds). For this strategy, motorists can be provided with information related to the work zone, static and/or real time, via wireless or handheld devises. These can be in the form of cell phones, pagers, in-vehicle systems, or e-mail notifications. Depending on the size, nature, and duration of the project, hand-held-type devices could be purchased or made available to motorists who regularly travel through the work zone to warn them of potential delays on a real-time basis.