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# **Guidelines for Hurricane Evacuation Signing and Markings**

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## ***Evaculane Pavement Marking***

On some evacuation routes in some districts, the Texas Department of Transportation (TxDOT) converts the emergency shoulder into a temporary travel lane during an evacuation (i.e., termed an “Evaculane” by some districts). Currently, TxDOT has some variety among pavement marking designs for Evaculanes throughout the coastal areas. Driver comprehension surveys indicate that a standard hurricane evacuation route symbol on a blue background placed in the shoulder is comprehended the best and motorists prefer this design when such Evaculane markings are used (Figure 1). Some districts also use supplemental arrows in conjunction with the markings (Figure 2). Such arrows have neither positive nor negative effects on driver comprehension or preference; consequently, arrows are optional.



**Figure 1. Hurricane Evacuation Route Symbol**



**Figure 2. Symbol with Supplemental Arrow**

## ***Contraflow Crossover Signs***

Several districts have established plans to operate contraflow evacuation routes. Currently, a standard sign does not exist to convey the presence and operation of such contraflow operations. Studies of two signing options (see [Figure 3](#)) show that neither was well understood by drivers. In the case of the sign at the bottom of this figure, it is possible that providing arrows that clearly define all options for route decisions could improve comprehension. Additionally public education regarding the meaning of “contraflow” could also increase the effectiveness of this type of signing.



**Figure 3. Contraflow Crossover Signs**



## ***Evacuation Route Signs (EM-1)***

Evacuation route trailblazing signs, either text- or symbol-based (EM-1T or EM-1a) are used extensively on hurricane evacuation routes statewide (Figure 4 and Figure 5, respectively). Where it is important to notify cross-street traffic that they have reached such a route, either type of sign is acceptable. However, arrows defining the direction of the evacuation should be provided at these decision points in order to ensure proper motorist comprehension and route selection. For the symbol-based sign (EM-1a), a supplemental arrow will need to be added (see Figure 5).



**Figure 4. EM-1T Evacuation Route Sign**



**Figure 5. EM-1a Evacuation Route Sign with Supplemental Arrow**

## ***Evacuation Route Designations on Overhead Guide Signs***

At major freeway/expressway diverge points, it is important to denote which facility is the evacuation route. An evacuation route text banner (white text on blue) should be used to make this designation (see [Figure 6](#)). Drivers indicated a preference to also include the hurricane evacuation route shield on the sign (see [Figure 7](#)), but this does not necessarily yield significant improvements in driver comprehension.



**Figure 6. Designation of Evacuation Route with a Text Banner**



**Figure 7. Text Banner and Evacuation Route Shield Combination**

## ***Evaculane Signing***

Signs are needed to inform motorists when an emergency shoulder (i.e., an Evaculane) is open for use during an evacuation. Two types of signs effectively convey this message (Figure 8 and Figure 9). Figure 8 shows beacons above the sign that are activated when the Evaculane is open and deactivated when the lane is closed to all vehicles except for emergency use (i.e., disabled vehicles, emergency roadside services, EMS). Figure 9 shows a type of sign that should be fabricated as a folding sign to be unfolded and displayed only when opening an Evaculane. During other times, the sign should be folded closed and not visible to approaching traffic.



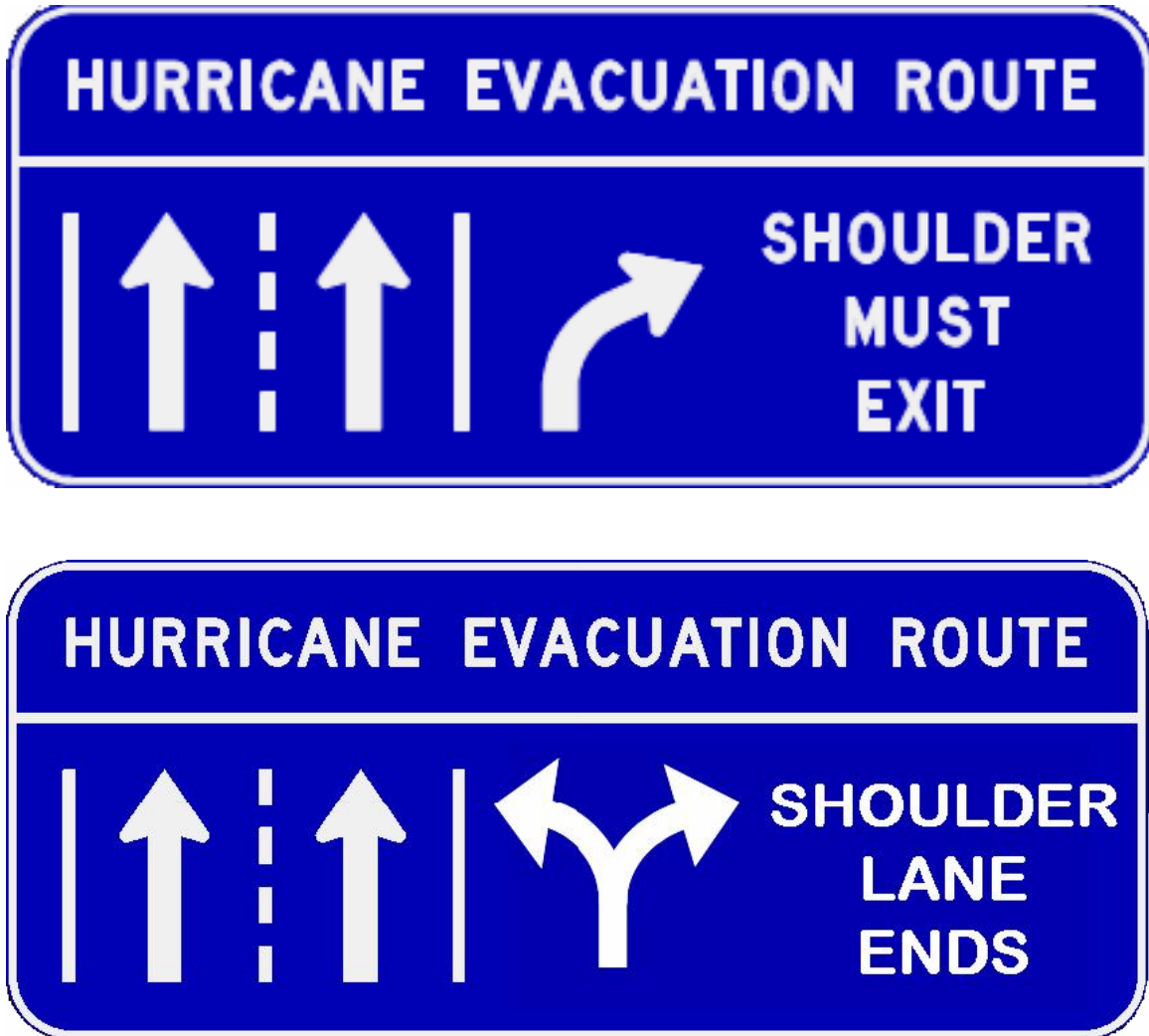
**Figure 8. Evaculane Signing with Flashing Beacons**



**Figure 9. Folding Evaculane Sign**

### ***“Evaculane Ends” Sign***

At locations where an Evaculane is being terminated, it is acceptable to use either of the signs shown in [Figure 10](#). Both types of signs are equally well understood by drivers.



**Figure 10. “Evaculane Ends” Signs**

### ***Folding Signs***

When motorists are traveling in contraflow lanes virtually all traffic signs are facing away from the driver, leaving contraflow motorists in need of critical motorist information. Consequently, it is necessary to place additional traffic signs such that they are readable by contraflow motorists. Except during contraflow operations, the only

signs viewable to motorists on the wrong side of the highway should be signs instructing motorists of prohibitions; e.g., WRONG WAY, DO NOT ENTER, etc. Therefore signs posted for contraflow motorists should not be readable by wrong-way traffic; i.e., they should not be displayed every day. An inexpensive and effective solution is the use of folding signs, as depicted in [Figure 11](#) through [Figure 12](#).

Where available, folding signs for contraflow lanes may be installed on the back of existing sign assemblies.

### Motorist Services Signs

The contraflow fuel plan is intended to result in no fuel shortages along the route. However, in the event that some gas stations run dry, folding signs, e.g., [Figure 11](#), indicating the distance to the next gas station and rest rooms may be opened, revealing messages to contraflow traffic.

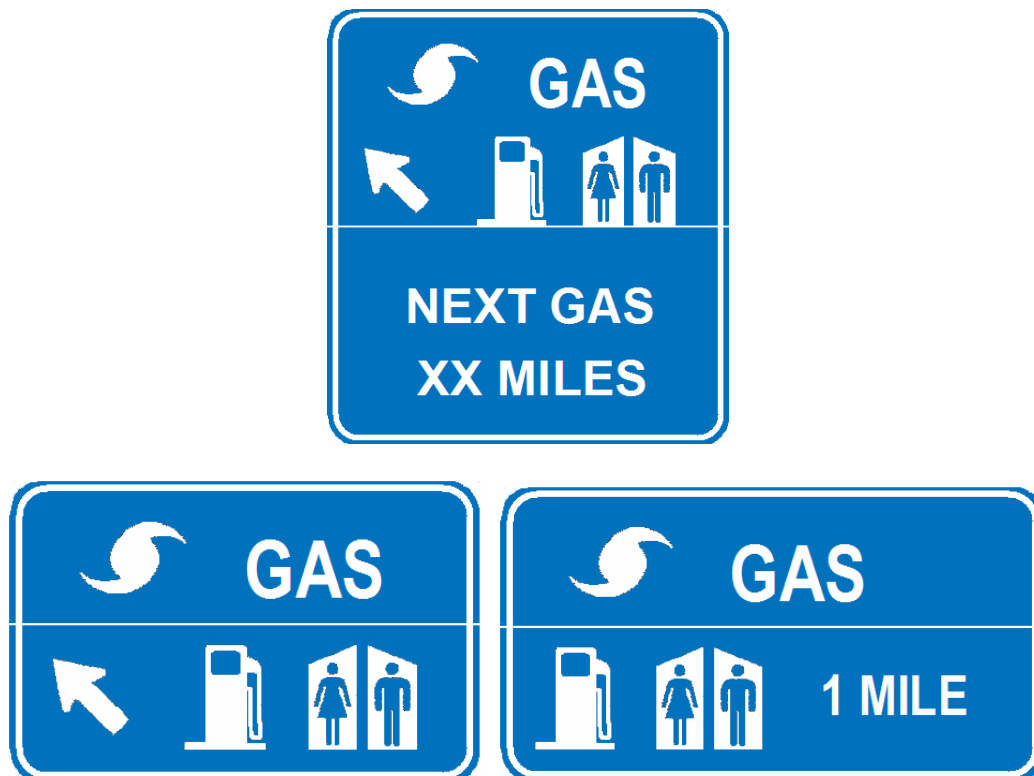


Figure 11. Folding Motorist Services Signs

### Contraflow Destination Signs

Folding contraflow destination signs, as shown in [Figure 12](#), are intended to provide route guidance to evacuating motorists.



**Figure 12. Folding Motorist Destination Signs**

### **Performance Plan**

Because of the possible long duration between hurricane evacuations and associated contraflow operations, folding signs may not be opened and displayed to traffic for extended time periods. All contraflow folding signs should be inspected annually to ensure that the sign sheeting, hinges, and latch mechanisms function properly.

### ***Exit Number Gore Markings***

Exit ramps on controlled-access highways, which are evacuation routes, are numbered and signed with E1-5(a-e) signs. This identification should be supplemented with the exit ramp number displayed as a pavement marking in the ramp gore, as shown in [Figure 13](#).

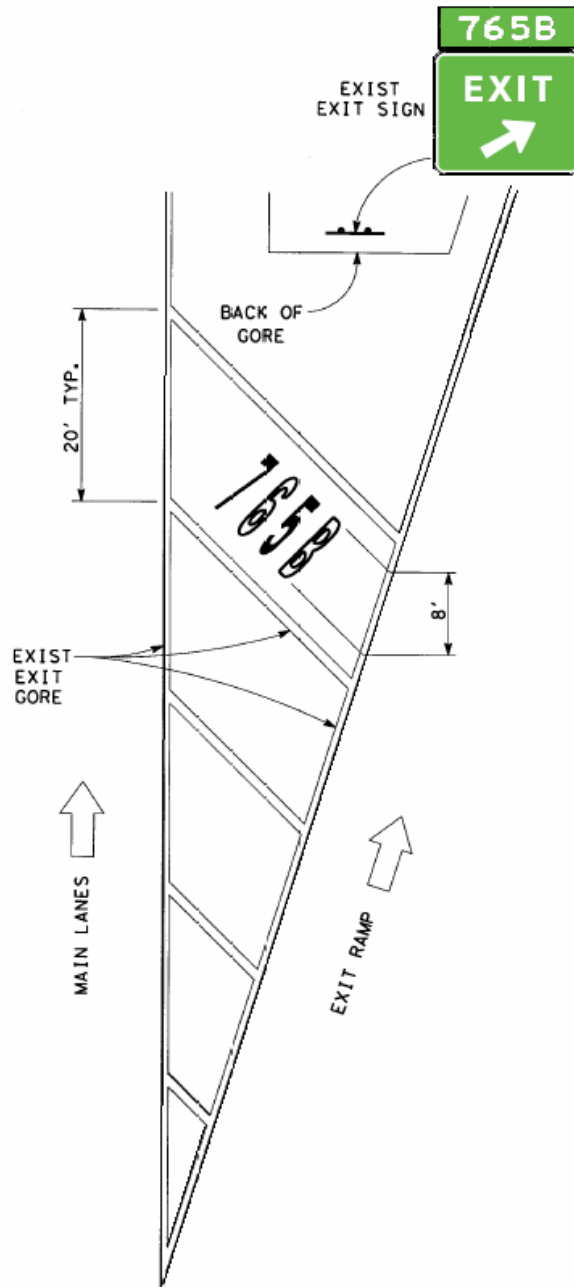


Figure 13. Exit Ramp Number Pavement Marking

### ***Dynamic Message Signing and Portable Changeable Message Signing***

When hurricane evacuations require the closure of roadways or travel lanes, route diversions, etc., the principles and procedures for developing and displaying messages on either permanent dynamic message signs (DMS) or portable changeable message signs (PCMS) provided in the *Dynamic Message Sign Message Design and Display Manual*



should be followed (available at <http://tti.tamu.edu/documents/0-4023-P3.pdf>). In addition, simplified messages for PCMS use for general warning and lane closure situations are available in the *Development of a Field Guide for Portable Changeable Message Sign Use in Work Zones* report (available at <http://tti.tamu.edu/documents/0-4748-2.pdf>). In addition to these recommendations, the following abbreviations should be used when necessary for hurricane evacuation-specific terms:

- EVAC TRAF (Evacuation Traffic)
- EVAC RTE (Evacuation Route)
- EVAC SHELTER (Evacuation Shelter)
- FUEL AVAIL (Fuel Available)

DMS and PCMS can also be used to provide advance planning and education information for future evacuation situations. Four different information stages exist where drivers may desire different types of information to make them feel comfortable with their travel decisions. These stages are as follows:

1. All hurricane season or once a hurricane is in the Gulf of Mexico but still with indeterminate landfall expectations.
2. Prior to a formal hurricane evacuation order being called, but a threatened area is determined.
3. Once a formal evacuation order has been issued.
4. No longer safe to start to evacuate (within a few hours of expected landfall within the area).

The following sections provide general driver information needs for each of these stages as well as a limited set of example messages for each. The associated figures (Figure 14 through Figure 17) depict alternating DMS display phases.

### **Stage 1: All Season/Prior to Hurricane Threat Messages**

Messages could contain information regarding:

- Determine safe evacuation routes inland
- Ride sharing suggestions
- Check vehicle maintenance
- Fill vehicle gas tank
- Know your emergency broadcast network
- Traffic operations education:
  - Contraflow lanes
  - Shoulder lanes
  - Where to get information regarding designated evacuation routes.

Stage 1 recommended messages are shown in Figure 14.



Message 1		
Phase 1		Phase 2
HURRICANE SEASON IS HERE		DO YOU KNOW YOUR EVACUATION ROUTE?
Message 2		
Phase 1		Phase 2
HURRICANE SEASON IS HERE		MAKE AN EVACUATION PLAN
Message 3		
Phase 1		Phase 2
HURRICANE SEASON IS HERE		PLAN TO RIDESHARE WITH FAMILY OR NEIGHBORS
Message 4		
Phase 1		Phase 2
HURRICANE SEASON IS HERE		RIDESHARING REDUCES EVACUATION TRAFFIC
Message 5		
Phase 1		Phase 2
HURRICANE SEASON IS HERE		IS YOUR VEHICLE MAINTENANCE UP TO DATE?
Message 6		
Phase 1		Phase 2
HURRICANE SEASON IS HERE		YOUR EMERGENCY BROADCAST NETWORK IS XXXX AM
Message 7		
Phase 1		Phase 2
HURRICANE SEASON IS HERE		EVACUATION ROUTE INFORMATION CALL <phone number>

**Figure 14. Stage 1 DMS Messages**

**Stage 2: Prior to Formal Evacuation**

The following are suggestions for message information content during this time:

- Reminder to pack a map of state and local area in case of evacuation
- Where to get information regarding designated evacuation routes
- Ridesharing suggestions

- Contact information for Red Cross shelters
- Provide the emergency broadcast station to use for current weather or evacuation conditions

[Figure 15](#) depicts suggested DMS messages for Stage 2.

### **Stage 3: During Formal Evacuation**

The information suggestions for this phase include:

- Post that a formal evacuation is currently underway
- Reminder to take a map of the state and local area
- Contact information for Red Cross shelters
- Encourage ridesharing
- Gas availability (if this becomes an issue)
- Information regarding shoulder or contraflow lanes (if they are enacted)
- Emergency broadcast station to use for current weather or evacuation conditions

Recommended Stage 3 messages are shown in [Figure 16](#).

### **Stage 4: No Longer Safe to Start an Evacuation**

The following information is recommended for messages during this time:

- Reminder to stay indoors
- Suggestion to return home or to go to the nearest shelter
- Contact information for local shelters

DMS message recommendations during Stage 4 are provided in [Figure 17](#).

Message 1		
Phase 1		Phase 2
HURRICANE IN GULF		YOUR EMERGENCY BROADCAST NETWORK IS XXXX AM
Message 2		
Phase 1		Phase 2
HURRICANE IN GULF		PLAN TO RIDESHARE WITH FAMILY OR NEIGHBORS
Message 3		
Phase 1		Phase 2
HURRICANE IN GULF		RIDESHARING REDUCES EVACUATION TRAFFIC
Message 4		
Phase 1		Phase 2
HURRICANE IN GULF		EVACUATION ROUTE INFORMATION CALL <phone number>
Message 5		
Phase 1		Phase 2
HURRICANE IN GULF		REMEMBER TO TAKE MAPS IF EVACUATING
Message 6		
Phase 1		Phase 2
HURRICANE IN GULF		CHECK YOUR EVACUATION SUPPLIES
Message 7		
Phase 1		Phase 2
HURRICANE IN GULF		RED CROSS SHELTER INFORMATION CALL<phone number>
Message 8		
Phase 1		Phase 2
HURRICANE IN GULF		NEED SPECIAL TRAVEL ASSISTANCE? CALL 211

**Figure 15. Stage 2 DMS Messages**

Message 1		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		TAKE STATE AND LOCAL MAPS
Message 2		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		RIDESHARE WITH FAMILY OR NEIGHBORS
Message 3		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		RIDESHARING REDUCES EVACUATION TRAFFIC
Message 4		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		FUEL AVAILABLE NEXT EXIT
Message 5		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		NEXT FUEL AVAILABLE EXIT XXX
Message 6		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		NEXT FUEL AVAILABLE XX MILES
Message 7		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		TUNE TO EMER BROADCAST XXXX AM

**Figure 16. Stage 3 DMS Messages**

Message 8		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		RED CROSS SHELTER INFORMATION CALL<phone number>
Message 9		
Phase 1		Phase 2
HURRICANE EVACUATION IN PROGRESS		DO NOT STOP ON SHOULDER

**Figure 16. Stage 3 DMS Messages (continued)**

Message 1		
Phase 1		Phase 2
HURRICANE LANDFALL SOON		SEEK SHELTER NOW
Message 2		
Phase 1		Phase 2
HURRICANE LANDFALL SOON		GO TO NEAREST SHELTER
Message 3		
Phase 1		Phase 2
HURRICANE LANDFALL SOON		LOCAL SHELTER INFORMATION CALL <phone number>
Message 4		
Phase 1		Phase 2
EXTREME WIND WARNING		SEEK SHELTER NOW

**Figure 17. Stage 4 DMS Messages**

