WORK ZONE TRAFFIC CONTROL

Ryan Delmotte, PE, CFM

John Stanley, PE, CFM
27,148
Work Zone Crashes in 2017

199 fatalities

27%
Compared to 2016
SAFETY A CONCERN!

Why?

<table>
<thead>
<tr>
<th>Year</th>
<th>Work Zone Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>174</td>
</tr>
<tr>
<td>2016</td>
<td>181</td>
</tr>
<tr>
<td>2017</td>
<td>199</td>
</tr>
</tbody>
</table>
LIABILITY

▸ Construction Workers, Drivers & Pedestrians
▸ Defendants may include:
  ▹ Governmental agencies;
  ▹ Corporations; and/or
  ▹ Individuals.

▸ **Negligence** claims may be supported by evidence and/or argument that:
  ▹ The TCP was inconsistent with MUTCD, AASHTO, or other governing standards;
  ▹ The Work Zone was confusing;
  ▹ The Work Zone did not provide positive guidance;
Work Zone Components

- **Termination Area**
  Road users Redirected to normal path (TMUTCD, Sec 6C.07)

- **Activity Area**

- **Transition Area**
  Road users Redirected from normal path (TMUTCD, Sec 6C.05)

- **Advanced Warning Area**
  Road users Informed (TMUTCD, Sec 6C.04, Table 6c-1)

Source: TMUTCD
Work Zone Components

Advanced Warning Area

Road users informed (TMUTCD, Sec 6C.04, Table 6c-1)

Source: TMUTCD
Transition Area
Road users Redirected from normal path (TMUTCD, Sec 6C.05)

Source: TMUTCD
Work Zone Components

Transition Area

Source: TMUTCD
### Table 6C-3. Taper Length Criteria for Temporary Traffic Control Zones

<table>
<thead>
<tr>
<th>Type of Taper</th>
<th>Taper Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merging Taper</td>
<td>at least L</td>
</tr>
<tr>
<td>Shifting Taper</td>
<td>at least 0.5 L</td>
</tr>
<tr>
<td>Shoulder Taper</td>
<td>at least 0.33 L</td>
</tr>
<tr>
<td>One-Lane, Two-Way Traffic Taper</td>
<td>50 feet minimum, 100 feet maximum</td>
</tr>
<tr>
<td>Downstream Taper</td>
<td>50 feet minimum, 100 feet maximum</td>
</tr>
</tbody>
</table>

Note: Use Table 6C-4 to calculate L.

### Table 6C-4. Merging Taper Lengths and Spacing of Channelizing Devices

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>Formula</th>
<th>10' Offset</th>
<th>11' Offset</th>
<th>12' Offset</th>
<th>On a taper</th>
<th>On a tangent</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>$L = \frac{WS^2}{60}$</td>
<td>150'</td>
<td>165'</td>
<td>180'</td>
<td>30'</td>
<td>60'</td>
</tr>
<tr>
<td>35</td>
<td>$L = \frac{WS^2}{60}$</td>
<td>205'</td>
<td>225'</td>
<td>245'</td>
<td>35'</td>
<td>70'</td>
</tr>
<tr>
<td>40</td>
<td>$L = \frac{WS^2}{60}$</td>
<td>265'</td>
<td>295'</td>
<td>320'</td>
<td>40'</td>
<td>80'</td>
</tr>
<tr>
<td>45</td>
<td>$L = \frac{WS^2}{60}$</td>
<td>345'</td>
<td>375'</td>
<td>400'</td>
<td>45'</td>
<td>90'</td>
</tr>
<tr>
<td>50</td>
<td>$L = WS$</td>
<td>450'</td>
<td>495'</td>
<td>540'</td>
<td>50'</td>
<td>100'</td>
</tr>
<tr>
<td>55</td>
<td>$L = WS$</td>
<td>550'</td>
<td>595'</td>
<td>640'</td>
<td>55'</td>
<td>110'</td>
</tr>
<tr>
<td>60</td>
<td>$L = WS$</td>
<td>660'</td>
<td>705'</td>
<td>750'</td>
<td>60'</td>
<td>120'</td>
</tr>
<tr>
<td>65</td>
<td>$L = WS$</td>
<td>780'</td>
<td>815'</td>
<td>860'</td>
<td>65'</td>
<td>130'</td>
</tr>
<tr>
<td>70</td>
<td>$L = WS$</td>
<td>900'</td>
<td>935'</td>
<td>980'</td>
<td>70'</td>
<td>140'</td>
</tr>
<tr>
<td>75</td>
<td>$L = WS$</td>
<td>1020'</td>
<td>1060'</td>
<td>1110'</td>
<td>75'</td>
<td>150'</td>
</tr>
<tr>
<td>80</td>
<td>$L = WS$</td>
<td>1140'</td>
<td>1180'</td>
<td>1230'</td>
<td>80'</td>
<td>160'</td>
</tr>
</tbody>
</table>

* Taper lengths have been rounded off.

$L = \text{Length of Taper (Feet)}$  $W = \text{Width of Offset (Feet)}$  $S = \text{Posted Speed (MPH)}$
Termination Area
Road users Redirected to normal path (TMUTCD, Sec 6C.07)
WORK ZONE DESIGN SCENARIOS

How do we design it?
Traffic Control Options

Traffic Control Narrative
General phasing/detour requirements
Contractor responsible for submitting detailed plans prior to construction

Traffic Control Plan
Detailed plans depicting all phases of construction
Prepared by consultant as part of design scope
Contractor submits plans only if they want to deviate from approved plans
TRAFFIC CONTROL NOTICES

1. THESE NOTES PERTAIN TO TRAFFIC CONTROL MEASURES ALONG TIMBERLAKE DRIVE ONLY. REFER TO SHEET C7.02 FOR REQUIREMENTS WITHIN TIMBERLAKES DRIVE.

2. THE CONTRACTOR SHALL PROVIDE, CONSTRUCT, AND MAINTAIN BARRIERS AND SIGNS IN ACCORDANCE WITH THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES UNTIL TIMBERLAKE CITY, CITY OF ARLINGTON DESIGN CRITERIA MANUAL, AND THE TRAFFIC CONTROL NARRATIVE INCLUDED IN THE PLANS.

3. CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN FOR CITY REVIEW AND APPROVAL SEPARATELY.

4. REQUIRED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS.

5. MINIMUM REQUIREMENTS FOR TRAFFIC CONTROL SHALL INCLUDE:

   a. MARKING ACCESS TO ALL ORTHO STREETS.
   b. Width of 32 foot edge to edge all weather riding surface at all times to permit local traffic flow. Lane width minimum is 11 feet, need to maintain (2) 11-foot lanes at all times.
   c. A minimum of one lane of traffic in each direction along timberlake drive shall be maintained at all times unless otherwise noted.
   d. The contractor shall provide access to all businesses located at all times during the construction.

6. CONTRACTOR SHALL PROVIDE EMERGENCY VEHICLE ACCESS, hd service, and trash service to all business addresses in the project area. At all times, the contractor shall coordinate with the city regarding emergency service access prior to planned lane, roadway or intersection closures. The traffic control measures shall be coordinated with the city traffic signal operations shall be permitted, unless approved by the city prior to implementation.

7. DATA COLLECTION CLOSURE ON CITY THEORIES, CLOSURE BETWEEN THE HOURS OF 8:30 A.M. AND 5:00 P.M. LINCOLN STREET CLOSURE WILL BE ALLOWED WITHIN 4 HR APARTMENT APPROVAL. WORK SHALL BE DONE ONLY DURING THE HOURS BETWEEN 7AM AND 6PM UNLESS WRITTEN APPROVAL FOR EXTENDED HOURS IS OBTAINED FROM THE CITY.

8. CONTRACTOR SHALL NOTIFY THE CITY OF ARLINGTON AT LEAST 48 HOURS IN ADVANCE OF IMPLEMENTING TRAFFIC CONTROL MEASURES AT INTERSECTIONS.

9. Ongoing pedestrian routes shall be maintained at all times of deterrents around the work zone. Pedestrian traffic control shall include advanced warning and appropriate safety features in accordance with the Texas Manual On Uniform Traffic Control Devices. Timberlake City, and city guidelines. Pedestrian routes shall be included with the contractor's submitted temporary traffic control plan.

10. CONTRACTOR SHALL PROVIDE ELECTRONIC PORTABLE CHANGEABLE MESSAGE SIGNS (CMS) FOR ALL LANE CLOSURES IN EACH DIRECTION OF TRAFFIC TO NOTIFY THE PUBLIC OF UPCOMING CLOSURES AND TRAFFIC SHIFTS. CMS SHALL BE PLACED NO LATER THAN SEVEN (7) CALENDAR DAYS PRIOR TO CLOSURES AND TRAFFIC SHIFTS. CITY SHALL APPROVE ALL MESSAGE BOARD LOCATIONS AND MESSAGES PRIOR TO IMPLEMENTATION.

11. CONTRACTOR SHALL ASSIGN A SUPERVISION AUTHORITY BY CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL COORDINATE WITH PROPERTY OWNERS PRIOR TO ANY WORK IMPACTING DRIVES.

12. OTHER CONSTRUCTION IMPACT TRAFFIC PATTERNS IN THE PROJECT AREA MAY TAKE PLACE DURING THE CONSTRUCTION. CONTRACTOR SHALL COORDINATE ANY NEEDED CLOSURE WITH CLOSURES WITH OTHER WORK TO MAINTAIN TRAFFIC FLOW, TRAFFIC SAFETY, AND MINIMIZE THE INCONVENIENCE TO TRAVELING PUBLIC.

13. ALL TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE REMOVED AS SOON AS PRACTICAL. WHEN THEY ARE NO LONGER NEEDED. WHEN WORK IS SUSPENDED FOR SHORT PERIODS OF TIME AT THE END OF THE WORKDAY, TEMPORARY TRAFFIC CONTROL DEVICES THAT ARE NOT LS APPROPRIATE SHOULD BE REMOVED OR COVERED SO THAT THEY ARE NOT VISIBLE.

14. CONTRACTOR SHALL PROVIDE TEMPORARY SIGNAGE AND OR TRAFFIC SIGNAL MODIFICATIONS DURING EACH CONSTRUCTION PHASE.

15. ALL WORK REQUIRED UNDER THIS CONSTRUCTION CONTRACT SHALL BE FULLY COMPLETED AND READY FOR ACCEPTANCE IN ACCORDANCE WITH THE CONTRACT TIME STATED IN THE CONSTRUCTION CONTRACT.

16. WORK WITHIN THE ROADWAY SHALL BE CONSTRUCTED IN TWO (2) SEPARATE SECTIONS OF WORK. AS DESCRIBED IN THE TRAFFIC CONTROL NARRATIVE, CONTRACTOR SHALL NOT WORK MORE THAN ONE PHASE AT ANY TIME WITHOUT PRIOR APPROVAL FROM THE CITY. EACH PHASE OF WORK SHALL BE REVIEWED BY THE CITY TO DETERMINE STATUS OF WORK, CONTRACTOR SHALL RECEIVE THE CITY APPROVAL BEFORE INITIATING WORK IN THE NEXT PHASE.

17. CONTRACTOR SHALL SUBMIT AN ALTERNATE PHASING TO THE CITY FOR REVIEW AND APPROVAL ANY ALTERNATE PHASING SHALL BE SUBMITTED PRIOR TO THE PRE-CONSTRUCTION MEETING.

SUMMARY OF PHASE CONSTRUCTION

PHASE I CONSTRUCTION (SANITARY SEWER AND SOUTH BOUND LANE)

 SOUTH BOUND LAKES OF FAWKNER (27) SHALL BE CONSTRUCTED DURING PHASE I AS WELL AS COMPLETE THE SANITARY SEWER IMPROVEMENTS.

1. PLACE TEMPORARY PAINT MARKINGS FOR THIS PHASE.

2. PLACE CHANNELEDING DEVICES.

3. CONSTRUCT 6" SANITARY SEWER AND SANITARY SEWER MANHOLES.

4. CONSTRUCT STREET SWALE, LATERAL EXTENSIONS.

5. PLACE CONCRETE CURB AND GUTTER.

6. CONSTRUCT DRAWS.

PHASE II CONSTRUCTION (NORTH BOUND LANE)

NORTH BOUND LAKES OF FAWKNER (27) SHALL BE CONSTRUCTED DURING PHASE II.

1. PLACE TEMPORARY PAINT MARKINGS FOR THIS PHASE.

2. PLACE CHANNELING DEVICES.

3. CONSTRUCT STREET SWALE, LATERAL EXTENSIONS.

4. PLACE CONCRETE CURB AND GUTTER.

5. CONSTRUCT DRAWS.
Traffic Control Plan
WORK ZONE
CASE SCENARIOS
How do we do it?
1-Lane Closure
1-Lane Closure
A Mixed Approach

Construction Area (Full Closure)

Zoomed In View for Detailed Area

Detour

Phasing Narrative
One -Way to Two -Way Traffic
One-Way to Two-Way Traffic

- Temporary Paving to Increase Activity Area / Safety
- Traffic Yields to Ramps
- Concrete Traffic Barriers with Crash Attenuators
Temporary Signals

ALL LEFT TURNS PROHIBITED DURING THIS PHASE OF CONSTRUCTION

NOTE: CONTRACTOR SHALL REMOVE SALVAGED SIGNAL HEADS INSTALLED IN PHASE 2, AND RETURN TO THE CITY. NEW SIGNAL HEADS SHALL BE INSTALLED FOR PHASE 4A EXCEPT ANY V3 SIGNAL HEADS INSTALLED ON ULTIMATE PED POLES, WHICH WILL REMAIN.

NOTES:
1. SEVERAL UTILITIES EXIT THE AREA, AND ALL UTILITIES EXISTING IN THE AREA ARE MARKED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEARING TREES IN THE UNDERGROUND DEPICTED PRIOR TO ANY DRILLING OR EXCAVATION ON THE PROJECT.
2. THE CONTRACTOR SHALL REMOVE ALL TRAFFIC CONSTRUCTION SIGNAL POLES AND PERMANENT TIMBER POLE INSTALLATION IN AREA 7 PRIOR TO ANY UTILITIES INSTALLATION THEREIN. THESE POLES WILL NOT BE RESUED, AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEARING TREES IN THE UNDERGROUND DEPICTED IN AREA 7.
3. TIGER UTILITIES SHALL COMMENCE INSTALLATION IN AREA 7 PRIOR TO THE CONSTRUCTION OF CABLES AND CONDUIT IN AREA 7. INSTALLATION OF ALL TRAFFIC CONSTRUCTION CABLES, LINES, AND UTILITIES IN AREA 7 PRIOR TO THE INSTALLATION OF THE CABLES AND CONDUIT.
4. CONTRACTOR SHALL REMOVE ALL TRAFFIC CONSTRUCTION SIGNAL HEADS FROM THE AREA. EXISTING PED ARM INSTALLATION REMAINS.
5. CONTRACTOR SHALL REMOVE ALL TRAFFIC CONSTRUCTION SIGNAL HEADS AND INSTALLATION IN AREA 7 PRIOR TO ANY UTILITIES INSTALLATION THEREIN.
6. THE CONTRACTOR SHALL REMOVE ALL TRAFFIC CONSTRUCTION SIGNAL HEADS AND INSTALLATION IN AREA 7 PRIOR TO ANY UTILITIES INSTALLATION THEREIN.
7. THE CONTRACTOR SHALL REMOVE ALL TRAFFIC CONSTRUCTION SIGNAL HEADS AND INSTALLATION IN AREA 7 PRIOR TO ANY UTILITIES INSTALLATION THEREIN.
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19. CONTRACTOR SHALL REMOVE ALL TRAFFIC CONSTRUCTION SIGNAL HEADS AND INSTALLATION IN AREA 7 PRIOR TO ANY UTILITIES INSTALLATION THEREIN.
20. CONTRACTOR SHALL REMOVE ALL TRAFFIC CONSTRUCTION SIGNAL HEADS AND INSTALLATION IN AREA 7 PRIOR TO ANY UTILITIES INSTALLATION THEREIN.
WORK ZONE
PRACTICAL STEPS
How do we implement it?
ACTION PLAN

▸ DRAFT YOUR TCP
  ▸ REVIEW YOUR TCP

▸ COMMUNICATE YOUR TCP
  ▸ REVIEW YOUR TCP

▸ IMPLEMENT YOUR TCP
  ▸ REVIEW YOUR TCP
COMMUNICATE YOUR TCP

Starting March 15, a portion of Scyene Road (Clay Mathis Road to Airport Boulevard) will be closed for a period of approximately six months. The closure is due to the Scyene Road reconstruction project approved by City Council in 2017. Learn more about the road closure in this episode of Mesquite in Motion.

Mesquite IN MOTION

SCYENE AND BERRY ROAD CLOSURES
COMMUNICATE YOUR TCP

Roadclosures@yourcity.com
IMPLEMENT YOUR TCP

BEFORE

• REVIEW
• PLAN FOR CONTINGENCIES
IMPLEMENT YOUR TCP DURING
- BE READY TO TWEAK
IMPLEMENT YOUR TCP

ACTION PLAN

BEFORE
• REVIEW
• PLAN FOR CONTINGENCIES

DURING
• BE READY TO TWEAK

AFTER
• DOCUMENT YOUR SUCCESSES (& FAILURES)
WORK ZONE
QUESTIONS
THANKS!

Any questions?
You can find us at

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