

**TOWN OF HORIZON CITY**

**DESIGN STANDARDS FOR  
CONSTRUCTION**



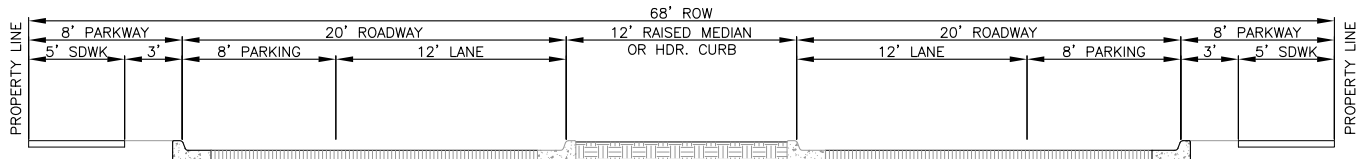
Public Works  
14999 Darrington Rd.  
Horizon City, Tx 79928

REVISED DECEMBER 2017

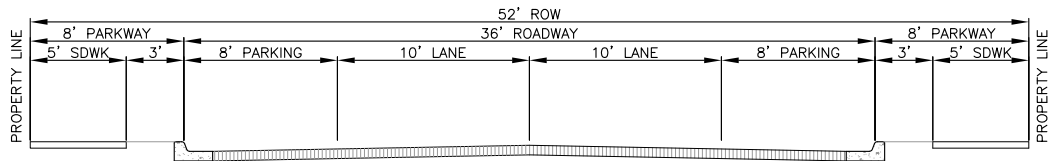
**TOWN OF HORIZON CITY**  
**DESIGN STANDARDS FOR CONSTRUCTION**  
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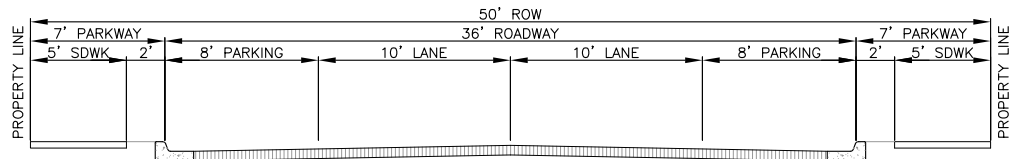
# **SECTION 1**



RESIDENTIAL COLLECTOR STREET  
FOUR (4) LANES



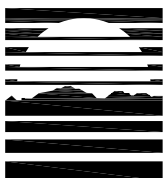
RESIDENTIAL SUBCOLLECTOR STREET  
TWO (2) LANES



LIMITED RESIDENTIAL STREET  
TWO (2) LANES

NOTE:

1. MAXIMUM CROSS SLOPE IN 3%.
2. MINIMUM PAVEMENT THICKNESS IS 2 INCH OF TXDOT TYPE 'C' HMAC.

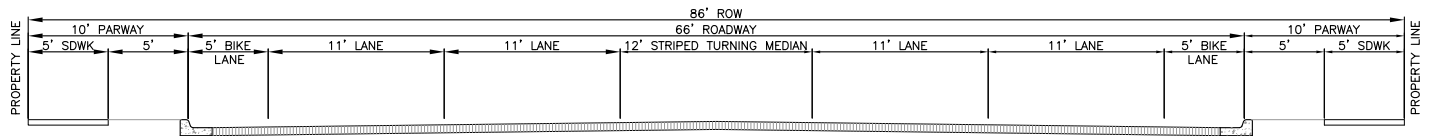


**TOWN OF  
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14999 DARRINGTON ROAD  
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915-852-1046

SECTION 1  
**DESIGN STANDARDS  
FOR CONSTRUCTION**

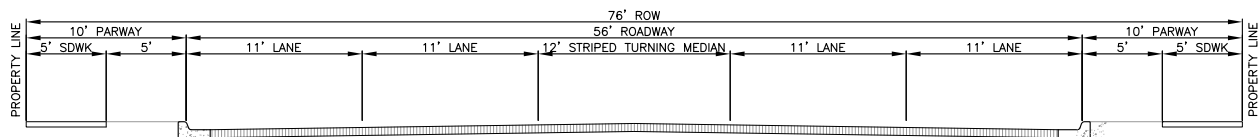
**STREET CROSS-SECTIONS  
1-01**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZL STAFF



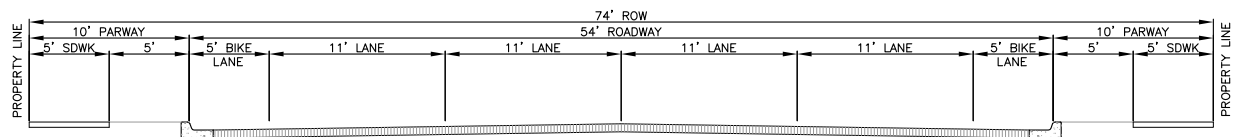
### MINOR ARTERIAL STREET WITH BIKE LANES

FOUR (4) LANES



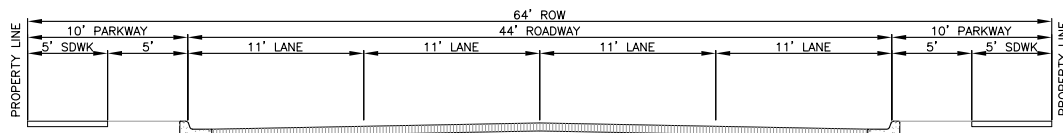
### MINOR ARTERIAL STREET

FOUR (4) LANES



### COLLECTOR ARTERIAL STREET WITH BIKE LANES

FOUR (4) LANES

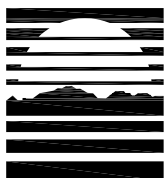


### COLLECTOR ARTERIAL STREET

FOUR (4) LANES

#### NOTE:

1. MAXIMUM CROSS SLOPE IN 3%.
2. MINIMUM PAVEMENT THICKNESS IS 2 INCH OF TXDOT TYPE 'C' HMAC.



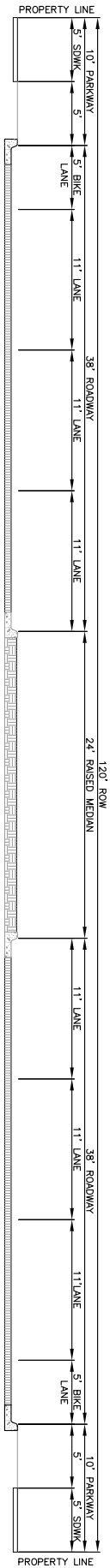
## TOWN OF HORIZON CITY

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14999 DARRINGTON ROAD  
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915-852-1046

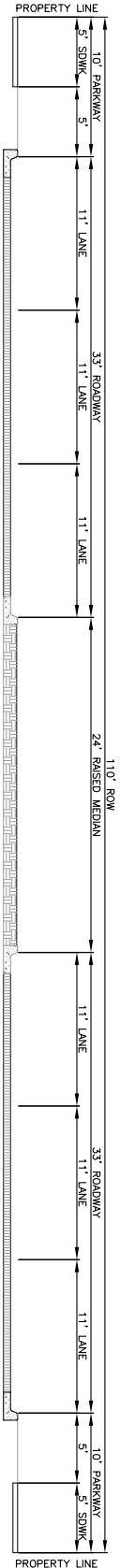
## SECTION 1 DESIGN STANDARDS FOR CONSTRUCTION

## STREET CROSS-SECTIONS 1-02

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



MAJOR ARTERIAL STREET WITH BIKE LANES  
SIX (6) LANES



MAJOR ARTERIAL STREET  
SIX (6) LANES

NOTE:

1. MAXIMUM CROSS SLOPE IN 3%.
2. MINIMUM PAVEMENT THICKNESS IS 2 INCH OF TXDOT TYPE 'C' HMAC.

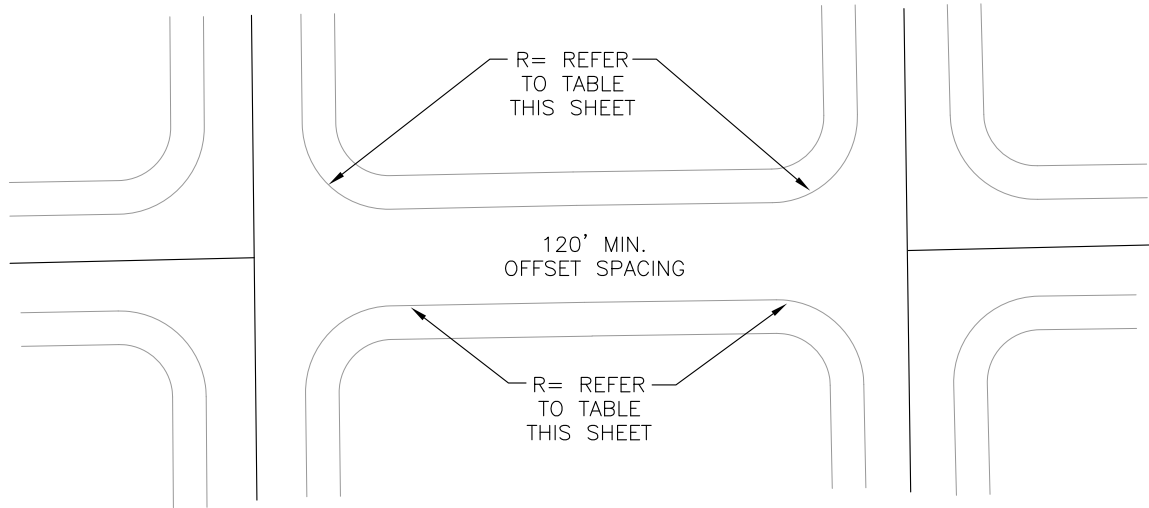


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**SECTION 1  
DESIGN STANDARDS  
FOR CONSTRUCTION**

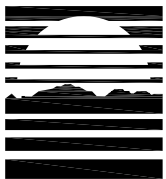
**STREET CROSS-SECTIONS  
1-03**

APPROVED BY: R. MEDINA  
DATE: SEPT. 25, 2017  
CHECKED BY: R. MEDINA  
DRAWN BY: HZL STAFF



ROADWAY CLASSIFICATION	DESIGN SPEED
ALLEY	15
LIMITED RESIDENTIAL	30
RESIDENTIAL SUBCOLLECTOR	30
RESIDENTIAL COLLECTOR	30
COLLECTOR ARTERIAL	40
MINOR ARTERIAL	45
MAJOR ARTERIAL	50

MINIMUM CURVATURE OF CURBS AT STREET INTERSECTIONS	
INTERSECTION	CURB TURN RADIUS
RESIDENTIAL WITH RESIDENTIAL	20' MIN
COLLECTOR OR ARTERIAL	25' MIN

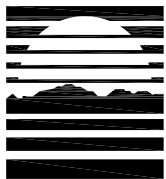
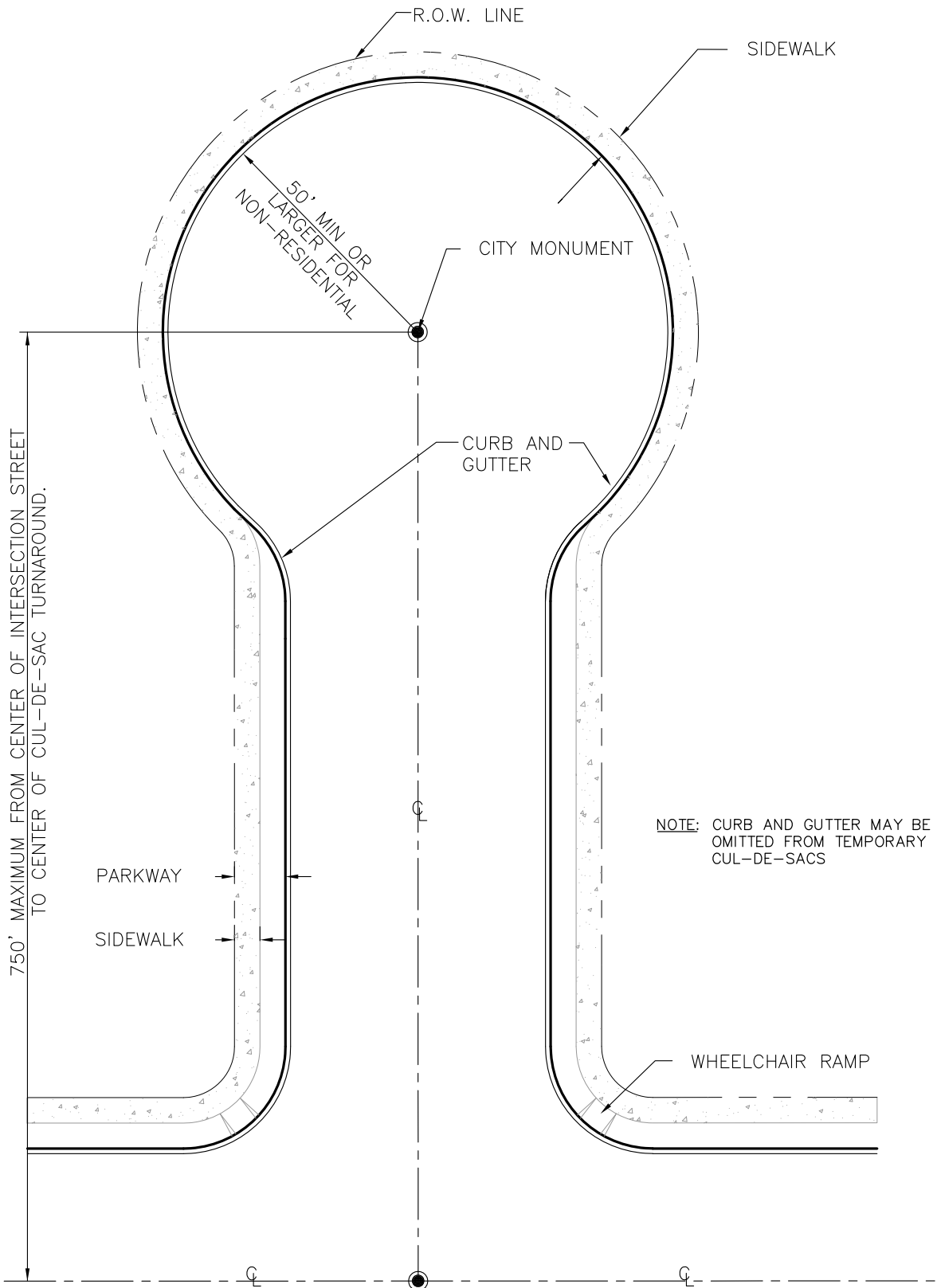


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**SECTION 1  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**STREET CROSS-SECTIONS  
1-04**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZL STAFF



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**SECTION 1  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**CUL-DE-SAC  
1-05**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



TYPE III GUARD RAIL  
AND DEAD END SIGN

PROPERTY LINE

TEMPORARY T OR L  
TURNAROUND DESIGN TO  
AASHTO GREEN BOOK STANDARDS

PAVED SURFACE

LAND FOR TEMPORARY TURNAROUND  
REVERTS TO ABUTTERS WHEN  
STREET IS CONTINUED

NOTE: CURB AND GUTTER MAY BE  
OMITTED FROM TEMPORARY  
TURN AROUND

R.O.W.

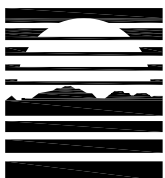
PARKWAY

SIDEWALK

SIDEWALK

WHEELCHAIR RAMP

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# TOWN OF HORIZON CITY

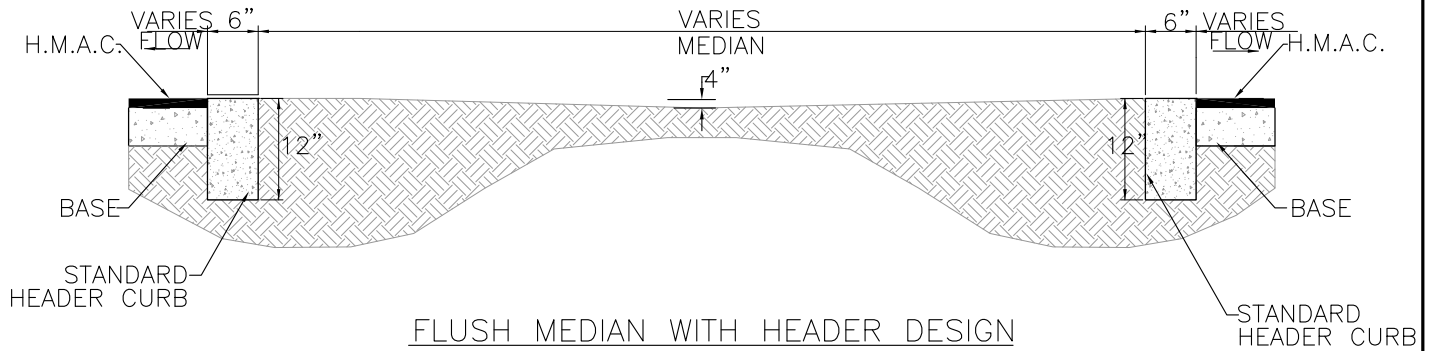
PUBLIC WORKS DEPARTMENT

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HORIZON CITY, TX 79928  
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## SECTION 1 DESIGN STANDARDS FOR CONSTRUCTION

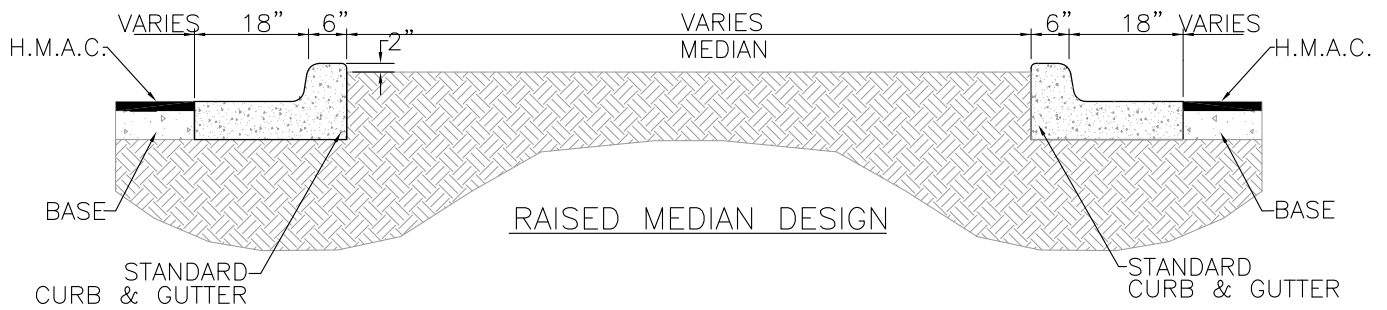
### STUB STREET 1-06

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZL STAFF

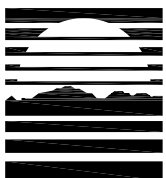


### FLUSH MEDIAN WITH HEADER DESIGN

TO BE USED WITH PRIOR PERMISSION OF  
PUBLIC WORKS DIRECTOR



### RAISED MEDIAN DESIGN



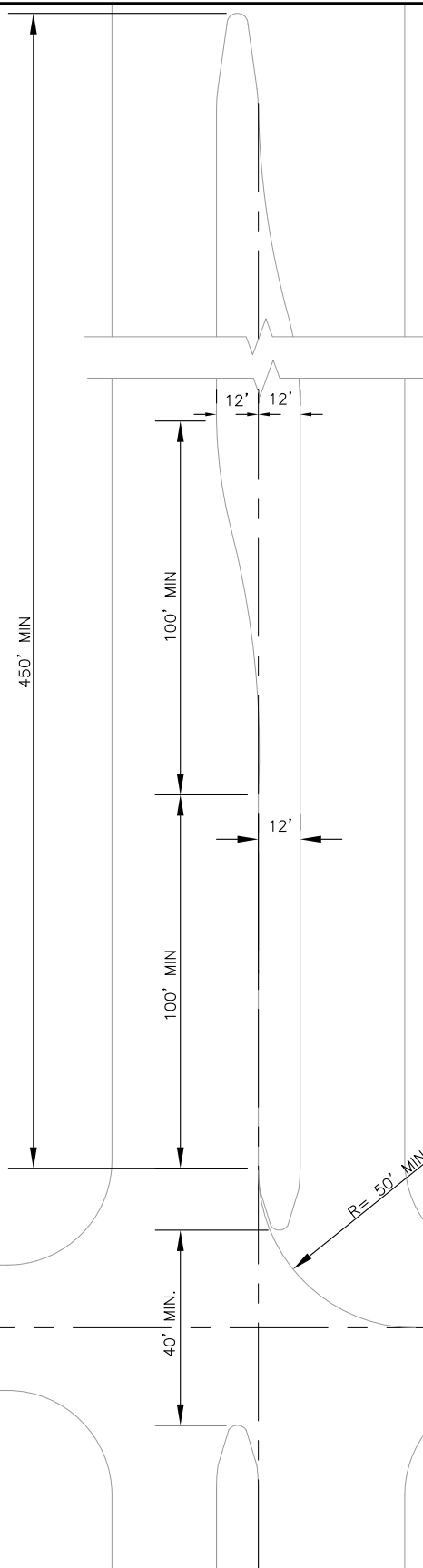
## TOWN OF HORIZON CITY

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915-852-1046

### SECTION 1 DESIGN STANDARDS FOR CONSTRUCTION

### FLUSH MEDIAN W/ HEADER & RAISED MEDIAN DESIGN 1-07

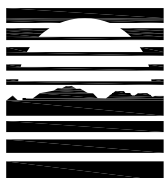
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZL STAFF



NOTE:  
LENGTH OF RADIUS, STORAGE AND TRANSITION TO BE  
INCREASED BASED UPON TRAFFIC DENSITY, ROAD DESIGN  
SPEED, AND PRESENCE OR ABSENCE OF TRAFFIC SIGNALS.  
AASHTO GREEN BOOK, ITE URBAN STREET DESIGN HANDBOOK,  
TXDOT ROADWAY DESIGN MANUAL AND SIMILAR RESOURCES  
SHALL BE CONSULTED.

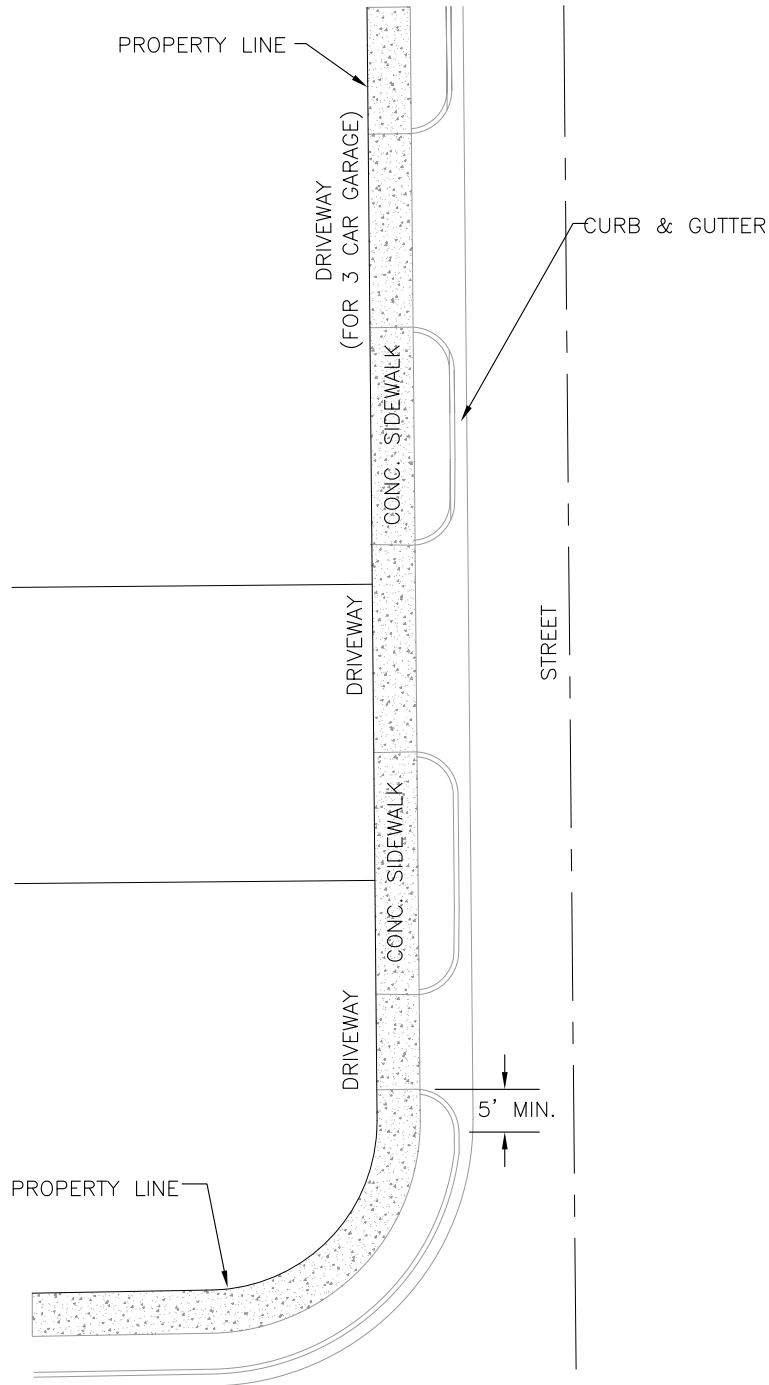
# SECTION 1 DESIGN STANDARDS FOR CONSTRUCTION

LEFT TURN LANE  
WITH 24' MEDIAN  
1-08

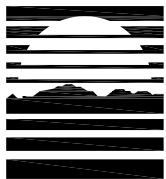


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DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



RESIDENTIAL DRIVEWAYS



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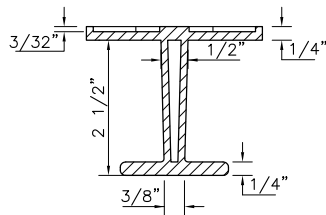
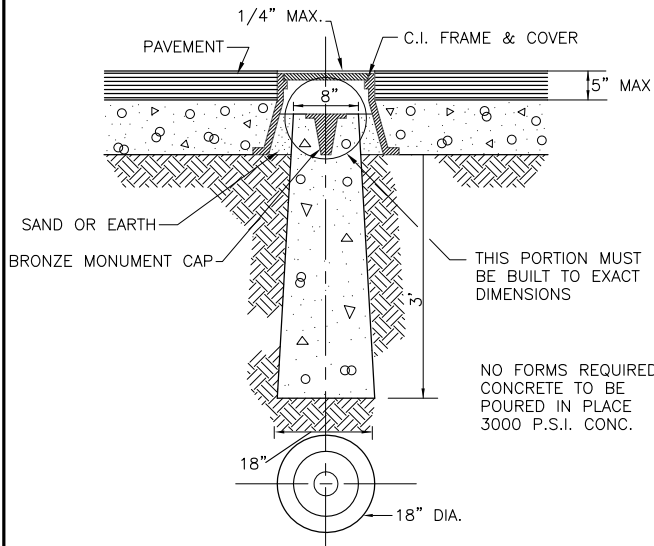
**SECTION 1  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**RESIDENTIAL  
DRIVEWAYS  
1-09**

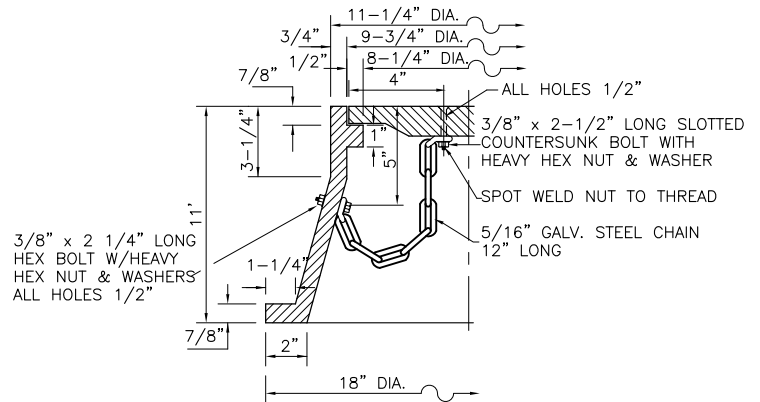
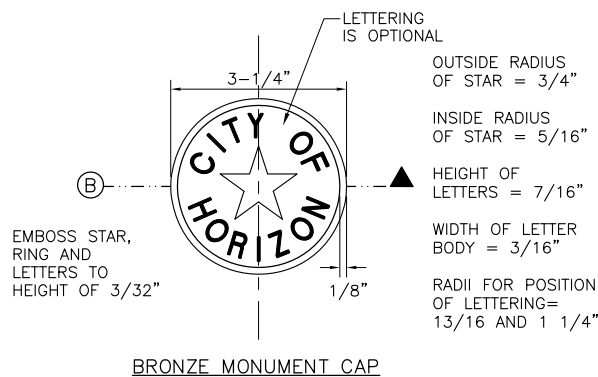
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZL STAFF

## **SECTION 2**

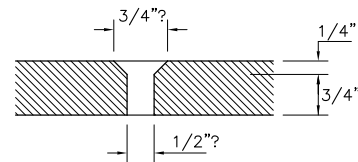
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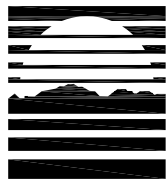
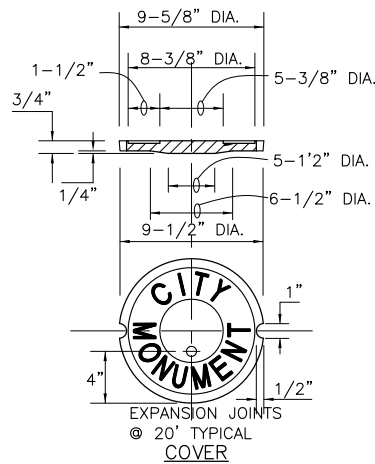
SECTION B



FRAME SECTION



COUNTERSUNK DETAIL

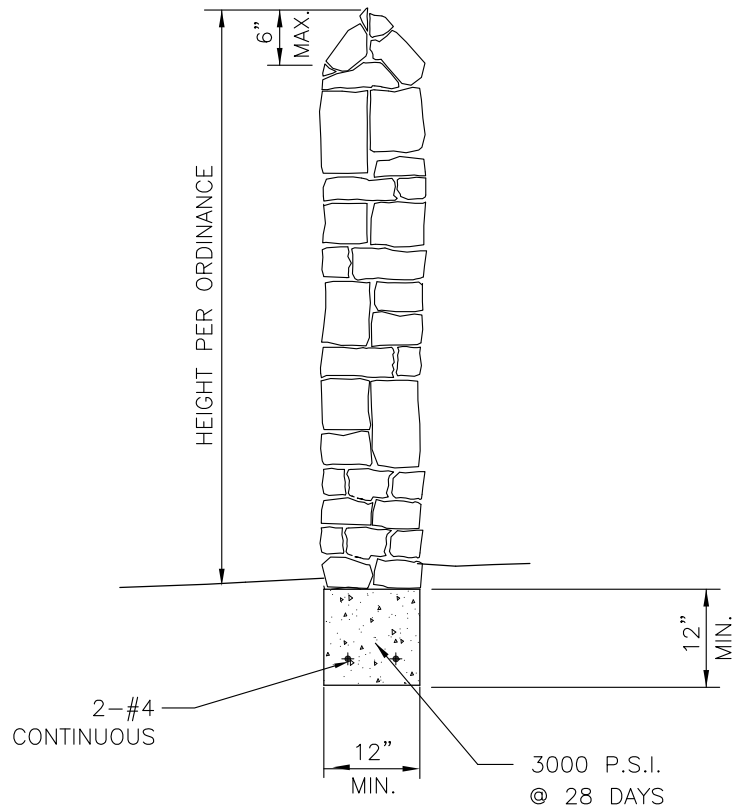


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**SECTION 2  
DESIGN STANDARDS  
FOR CONSTRUCTION**

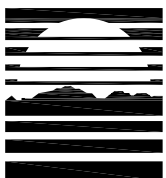
**CITY SURVEY MONUMENT  
2-01**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



ROCKWALL DESIGN NOTES:

1. STONE FOR ROCKWALL SHALL BE AS NEARLY UNIFORM IN SECTION AS PRACTICABLE. THE STONE SHALL BE DENSE AND RESISTANT TO AIR AND WATER.
2. MORTAR MUST BE TYPE "S" 1800 P.S.I. AS PER ASTM C270
3. MASONRY WALLS OVER SIX (6) FEET IN HEIGHT AND THOSE USED FOR EARTH RETENTION OVER TWO (2) FEET MUST BE DESIGNED AS AS STRUCTURAL WALLS.
4. ROCKWALL MORTAR JOINTS MUST NOT EXCEED TWO (2) INCHES.
5. PROVIDE ONE (1) INCH EXPANSION JOINTS AT EVERY 100 LINEAL FEET OF WALL.
6. ALL STONE SHALL BE THOROUGHLY SOAKED BEFORE BEING PLACED.
7. ALL STONE FOR ROCKWALLS SHALL BE FRACTURED QUARRIED ROCK, NO RIVER ROCK SHALL BE ALLOWED.

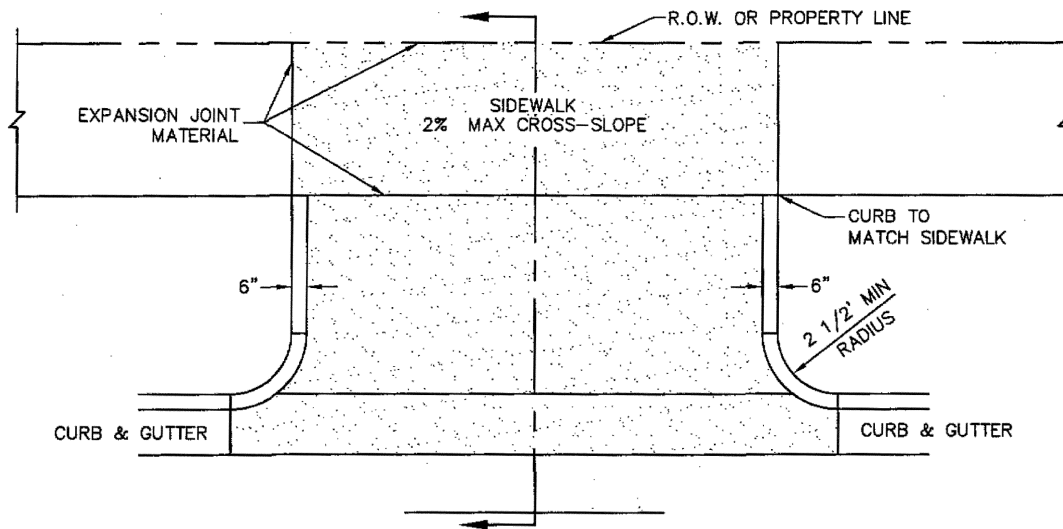


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**SECTION 2  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**ROCKWALL DESIGN  
2-02**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



**DRIVEWAY PLAN**  
NTS

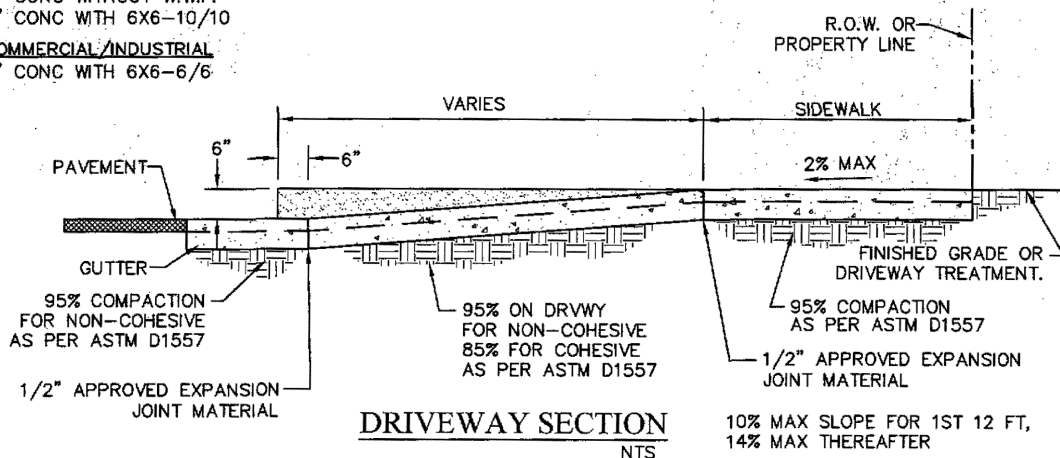
DRIVEWAY WIDTH	MIN	MAX
COMMERCIAL/INDUSTRIAL	24'	35'
RESIDENTIAL (SINGLE FAMILY 60' LOTS)	10'	20'
LESS THAN 60' LOTS, DUPLEX, AND TOWNHOMES	15'	25'
(REFER TO PLATE 6-16)		

**RESIDENTIAL**

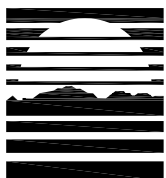
6" CONC WITHOUT W.W.F.  
4" CONC WITH 6X6-10/10

**COMMERCIAL/INDUSTRIAL**

6" CONC WITH 6X6-6/6



**DRIVEWAY SECTION**  
NTS



**TOWN OF  
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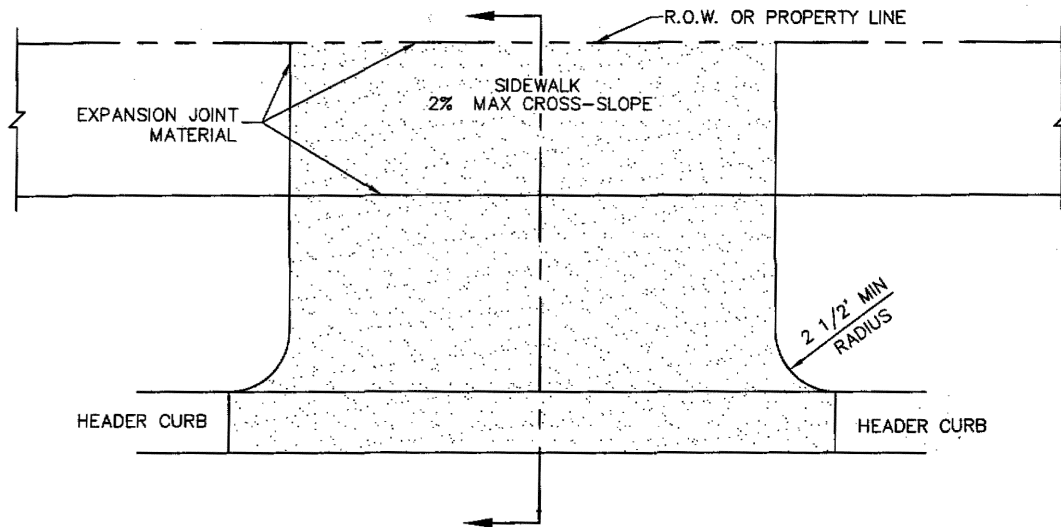
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**SECTION 2  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**DRIVEWAY WITH  
ONSITE PONDING  
2-03**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF





**DRIVEWAY PLAN**  
NTS

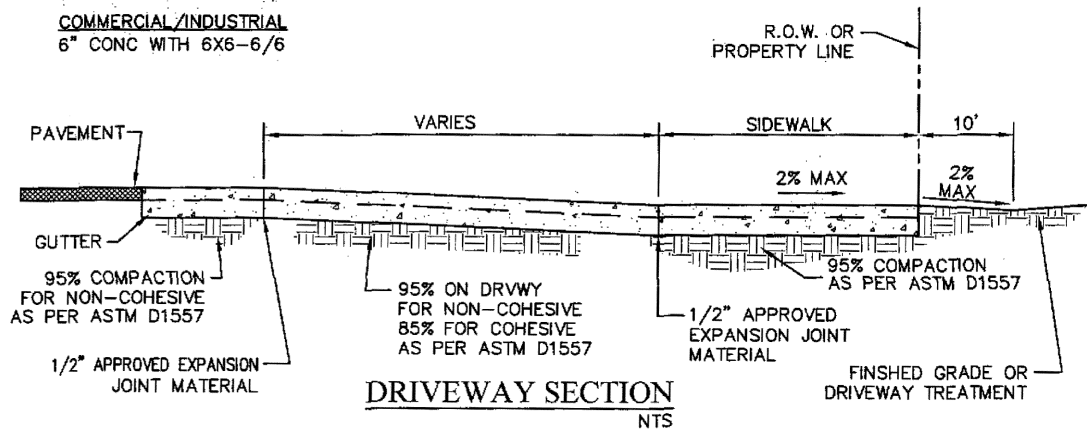
DRIVEWAY WIDTH	MIN	MAX
COMMERCIAL/INDUSTRIAL	24'	35'
RESIDENTIAL (SINGLE FAMILY 60' LOTS)	10'	20'
LESS THAN 60' LOTS, DUPLEX, AND TOWNHOMES (REFER TO PLATE 6-16)	15'	25'

**RESIDENTIAL**

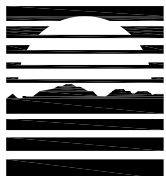
6" CONC WITHOUT W.W.F.  
4" CONC WITH 6X6-10/10

**COMMERCIAL/INDUSTRIAL**

6" CONC WITH 6X6-6/6



**DRIVEWAY SECTION**  
NTS



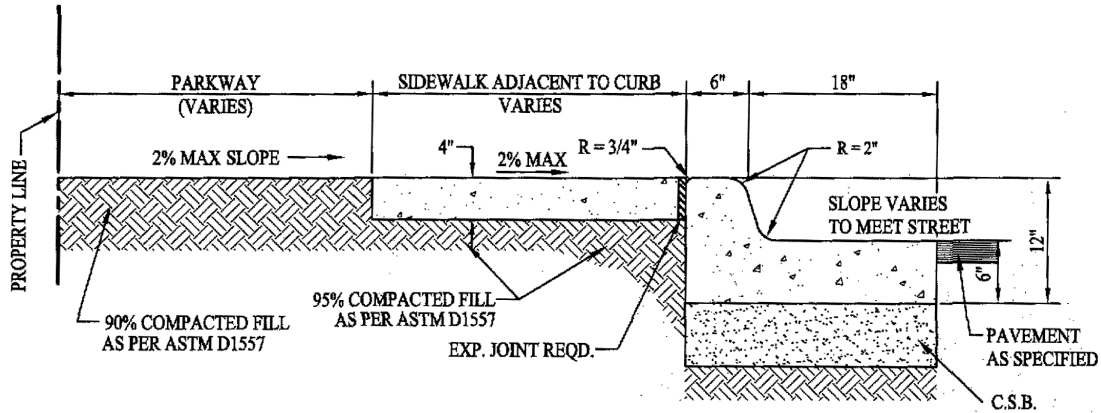
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**SECTION 2  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**CONCRETE DRIVEWAY  
WITH ONSITE PONDING  
2-04**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

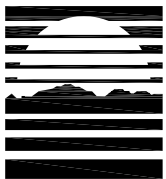


### CURB & GUTTER WITH SIDEWALK SECTION

C.S.B.

#### NOTES:

1. CONCRETE SHALL BE 3000 P.S.I. MIN.
2. DUMMY JOINT REQUIRED AT 10' O.C. FOR CURB & GUTTER AND 5' O.C. FOR SIDEWALK.
3. EXPANSION MATERIAL REQUIRED AT CURB RETURNS, AND AT 20' ON CENTER FOR SIDEWALKS WITH 1/2" PREMOLEDDED ASPHALT IMPREGNATED EXPANSION MATERIAL OR EQUAL.
4. EXPANSION JOINTS REQUIRED AT 50' O.C. WHEN FORMING FOR CURBS.



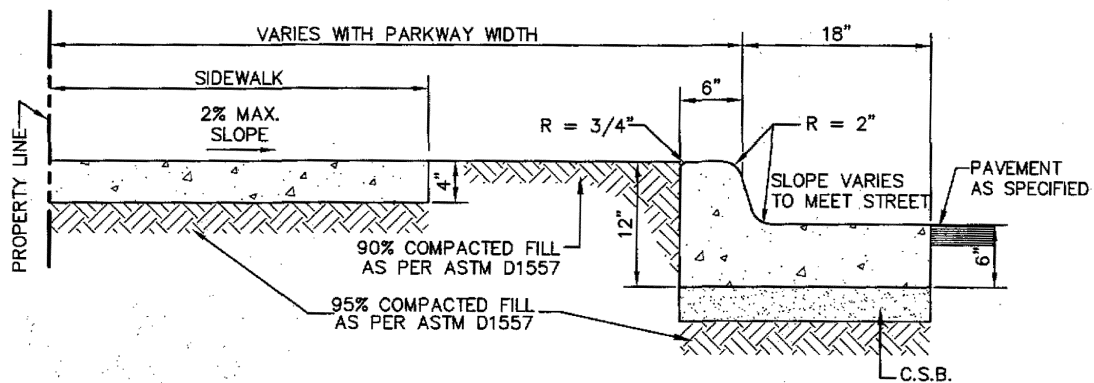
## TOWN OF HORIZON CITY

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### SECTION 2 DESIGN STANDARDS FOR CONSTRUCTION

### CONCRETE SIDEWALK ABUTTING CURB 2-05

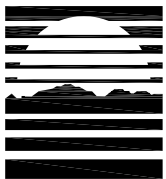
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



### CURB & GUTTER WITH SIDEWALK SECTION

#### NOTES:

1. CONCRETE SHALL BE 3000 P.S.I. MIN.
2. DUMMY JOINT REQUIRED AT 10' O.C. FOR CURB & GUTTER AND 5' O.C. FOR SIDEWALK.
3. EXPANSION MATERIAL REQUIRED AT CURB RETURNS AND AT 20' ON CENTER FOR SIDEWALKS WITH 1/2" PREMOLDED ASPHALT IMPREGNATED EXPANSION MATERIAL OR EQUAL.
4. EXPANSION JOINTS REQUIRED AT 50' O.C. WHEN FORMING FOR CURBS.



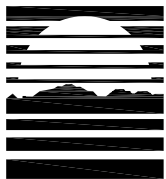
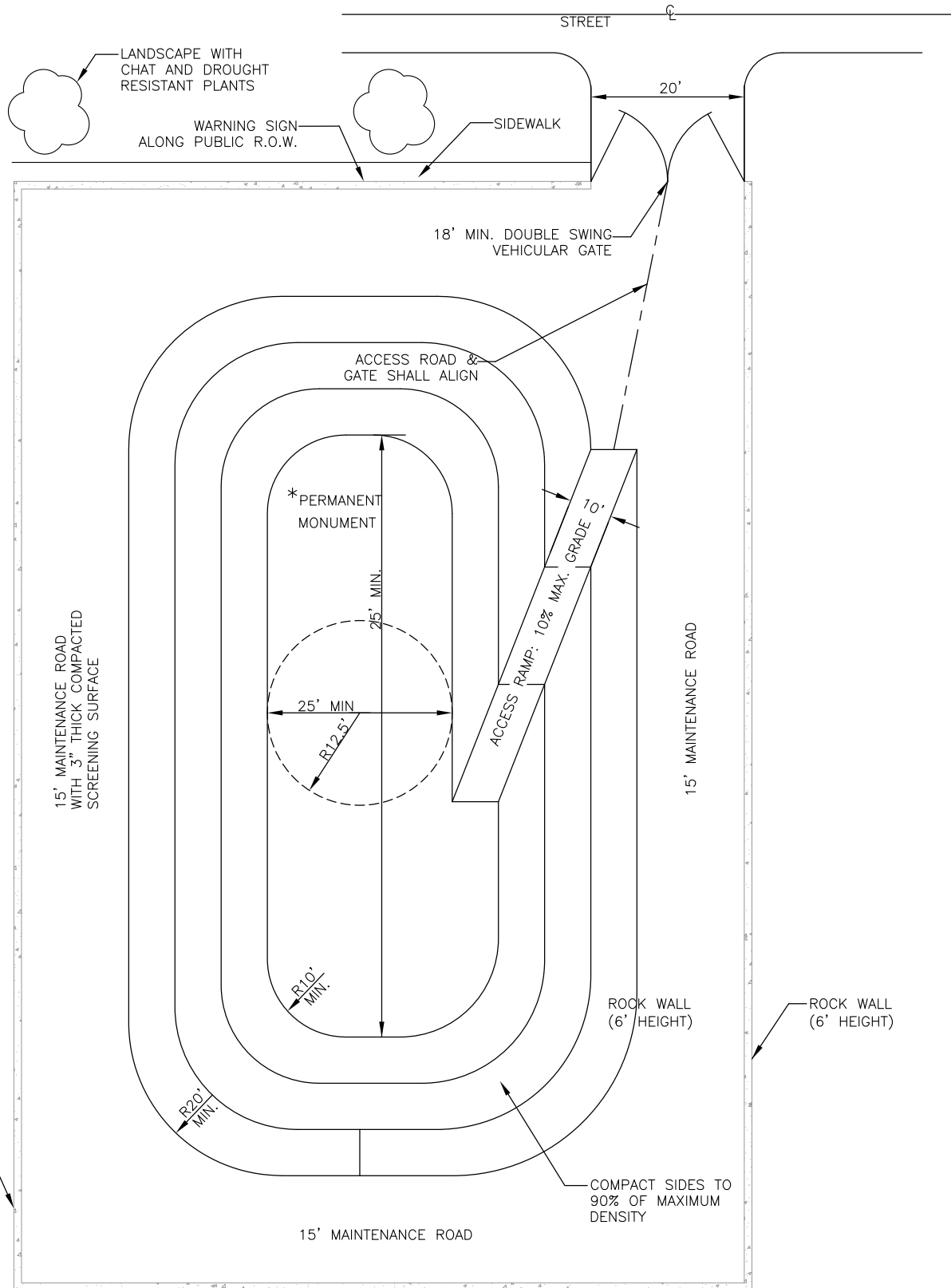
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### SECTION 2 DESIGN STANDARDS FOR CONSTRUCTION

**CONCRETE SIDEWALK  
WITH DETACHED CURB**  
2-06

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

## **SECTION 3**

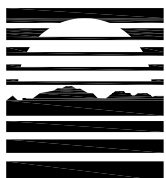


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**SECTION 3  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**RETENTION BASIN DESIGN  
3-01**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZL STAFF



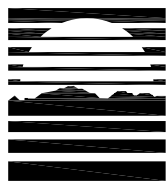
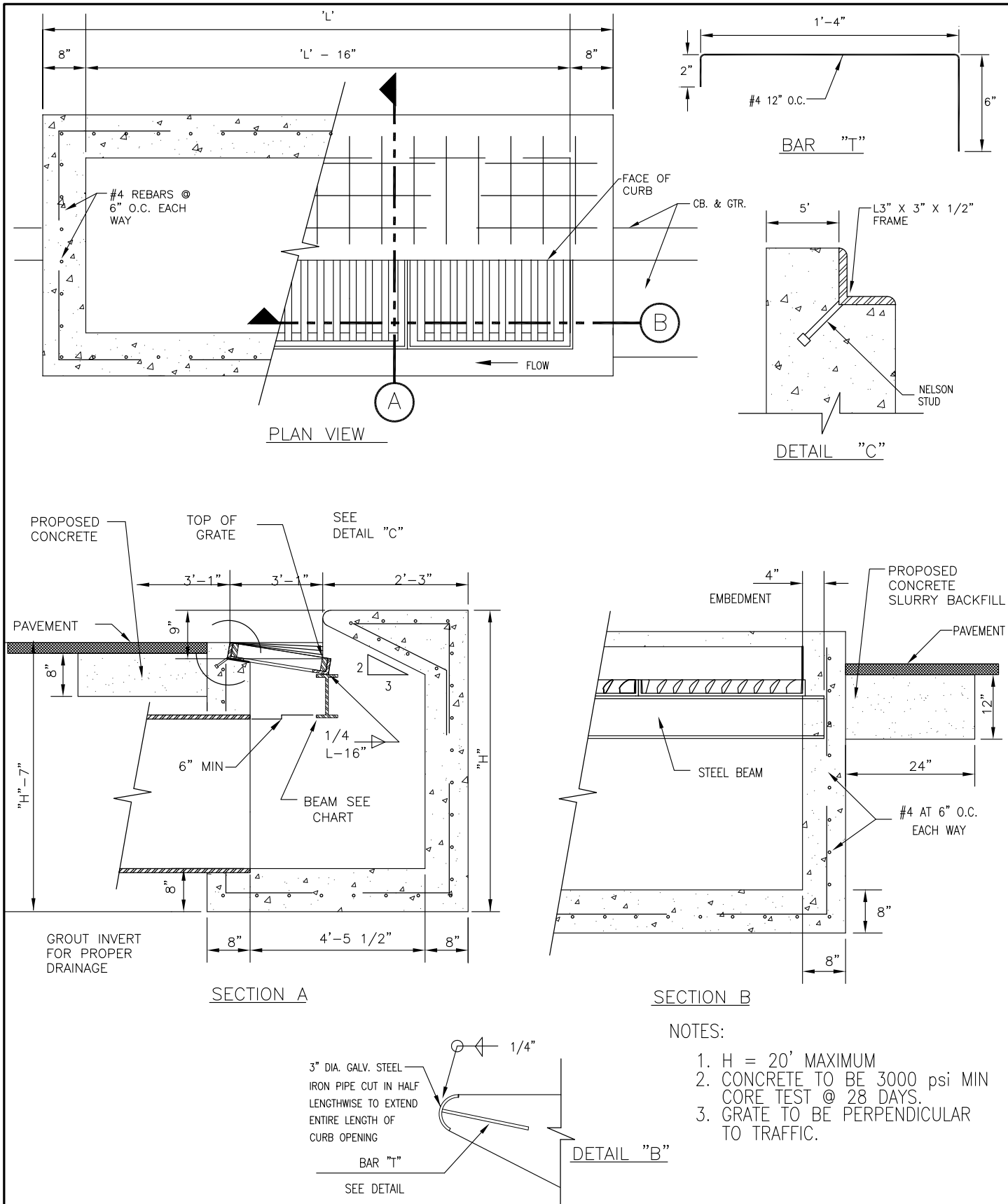
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14999 DARRINGTON ROAD  
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915-852-1046

## SECTION 3 DESIGN STANDARDS FOR CONSTRUCTION

## NO TRESPASSING WARNING SIGN 3-02

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

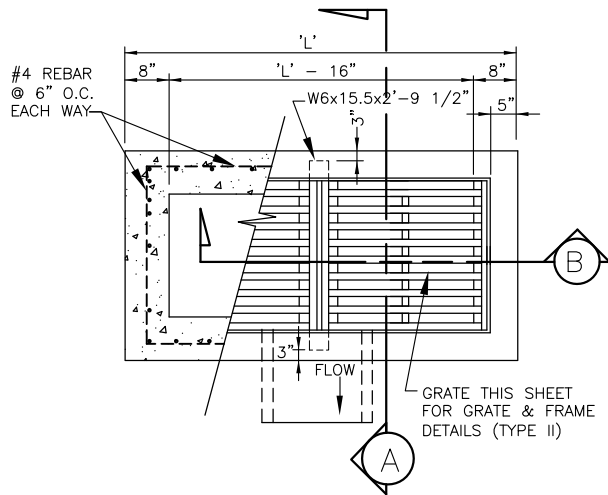


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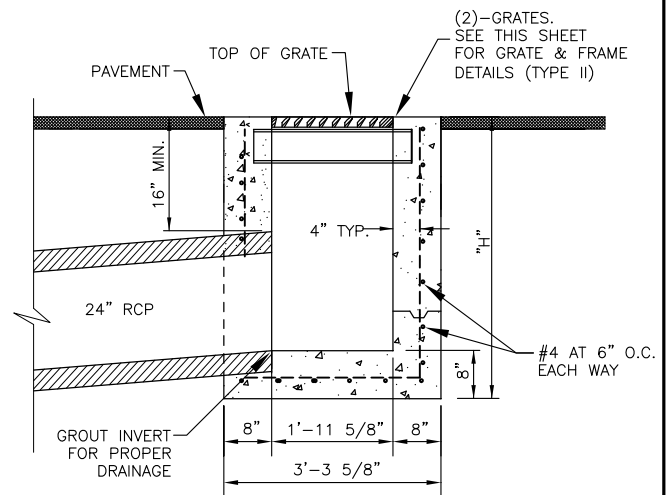
**SECTION 3  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**DROP INLET  
TYPE I  
3-04**

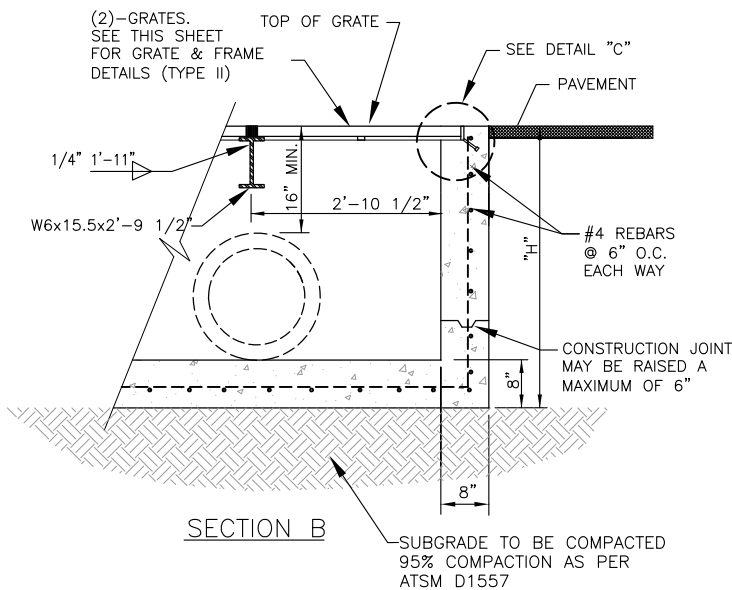
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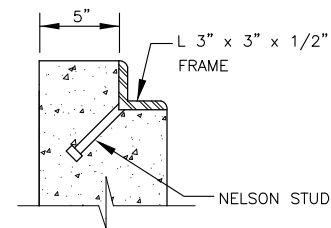
PLAN VIEW



SECTION A



SECTION B

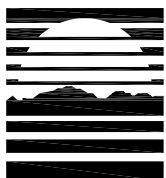


DETAIL "C"

NOTES:

1. H = 20' MAXIMUM
2. CONCRETE TO BE 3000 psi MIN LAB TEST @ 28 DAYS.
3. GRATE TO BE PERPENDICULAR TO TRAFFIC.

NUMBER OF GRATES	'L'
2	7' - 1"
3	10' - 2"
4	13' - 3"
5	16' - 4"



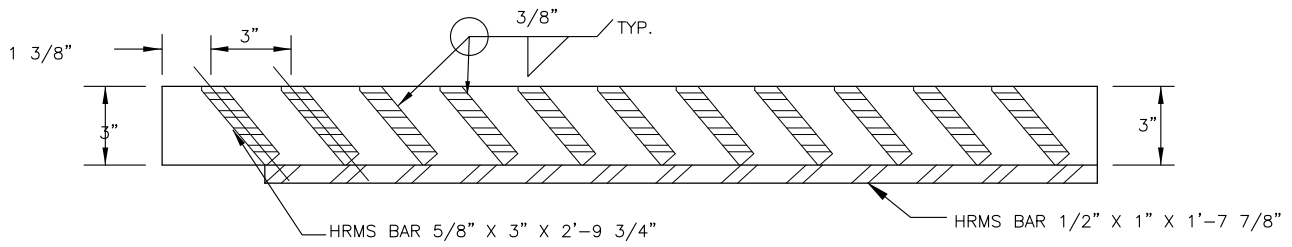
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915-852-1046

**SECTION 3  
DESIGN STANDARDS  
FOR CONSTRUCTION**

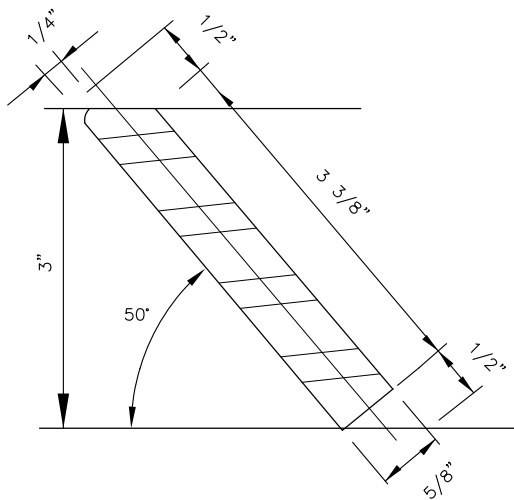
**DROP INLET  
TYPE II  
3-05**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

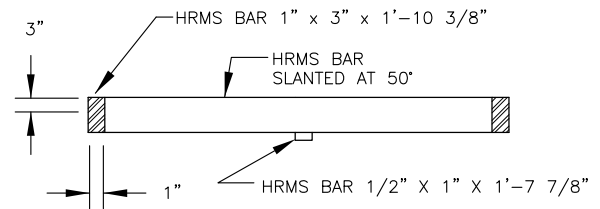




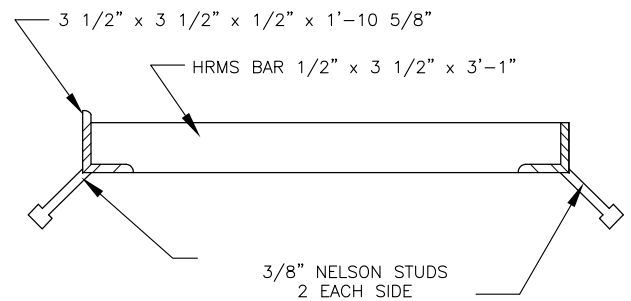
SECTION A



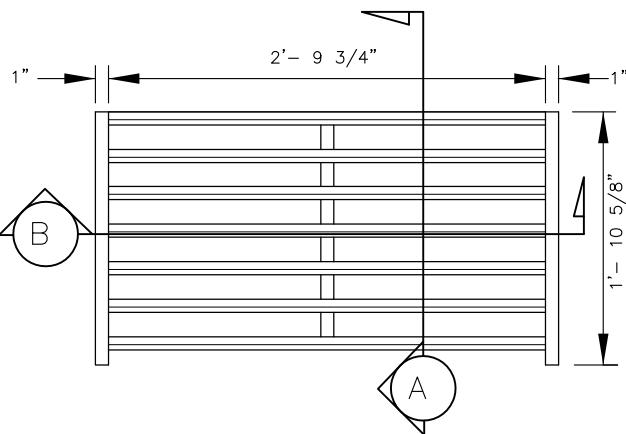
SLANTED BAR DETAIL



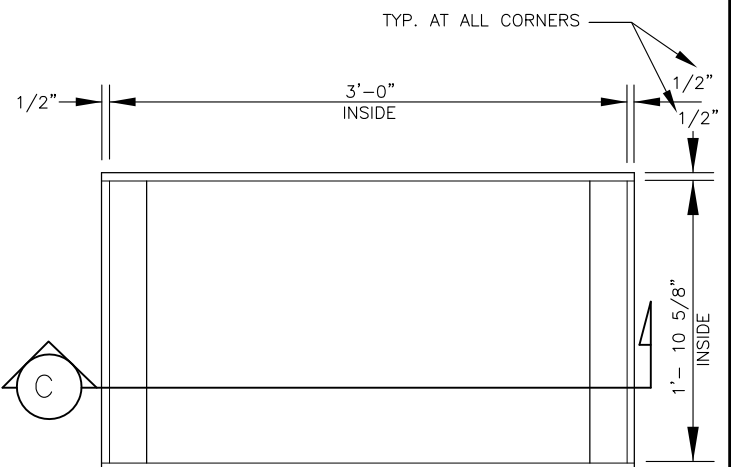
SECTION B



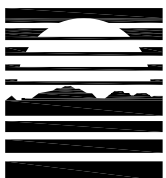
SECTION C



GRATE



FRAME



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**SECTION 3  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**GRATE & FRAME  
FOR DROP INLET  
3-06**

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DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

# **SECTION 4**

## PAVING CUT TRENCH REPAIR – GENERAL NOTES

Town of horizon city specifications for type c asphalt shall be used for pavement repairs unless otherwise directed by the city engineer. Contractor must use industry standard equipment & methods for paving.

Repairs perpendicular to the street that are more the 8' in width and extend from either gutter to gutter or from gutter to the center of the street will require the use of a paving machine.

Longitudinal repairs that are more than 8' in width and more than 15' in length will require the use of a paving machine.

Two-sack material shall be two sacks of cement per one cubic yard of soil, material must be pre-mixed, mixing on the job site will not be allowed. The material must be left to cure for a minimum of 24 hours & contractor must assure that the material is dry prior to applying emulsion and setting paving inspection.

Emulsified asphalt ss-1, ss-1h, css-1, or css-1 h shall be evenly applied throughout the cut. The emulsified asphalt shall have an application rate of 0.25 gal/sy. Emulsified asphalt shall be applied as a mixture of 25% to 30% emulsified asphalt to 75% to 70% water.

Replace all paving markings. Materials must meet town of horizon city public works department specifications.

Asphalt must be compacted with a steel drum roller; use of a plate tamper will not be allowed.

The use of vibratory equipment must be approved by the city engineer.

A 1" thick steel plate must be placed over the entire cut & have an asphalt transition; refer to sheet 3-59g.

Contractor must comply with osha safety guidelines that apply to trench excavations. Paving cut inspections will not be conducted if contractor is not in compliance with safety guidelines to include trench shoring.

Trenches less than 12" in width must be backfilled with 2-sack from top of conduit/pipe to 2" below surface grade. The asphalt surface must bridge trench per pavement cut trench repair details.

## SECTION 10 – SPECIFICATIONS

A. All Work, including but not limited to cutting of paving, excavation, backfill, bedding, base course and placement and compaction of pavement shall be done pursuant to the standards and specifications in the city's Design Standards for Construction or successor standards for construction in effect at the time of the issuance of the permit or as specified in the permit by the Public Works Director or designee. The DSC governs the construction and restoration of the streets, sidewalks, parkways, driveways, and related infrastructure within the City's Right-of-Way and does not apply to the construction related to Utility infrastructure within the City Right-of-Way.

B. MINIMUM PATCHING REQUIREMENTS. The minimum area that shall be patched pursuant to the standards in the DSC and any provision specified in the permit, includes:

1. FOR EXCAVATIONS OR CUTS ACROSS THE STREET WITHIN CITY RIGHT-OF-WAY: patching (a) the excavated or cut area; and (b) two feet from each side of the excavation or cut area; and (c) no more than ten feet in each direction from the areas patched pursuant to (a) and (b) of this paragraph, PROVIDED, HOWEVER, that (i) patching need not extend across a median when the excavation does not extend across the median; (ii) if the area patched under (a), (b) and (c) of this paragraph extends into an area that was patched prior to the excavation, the patching required shall be extended to include all of the area of the prior patch, as shown in the illustrations in the DSC; and (iii) that the fifth (5th) cut by the same Person or Utility (or more than five initially or after the repaving of the entire street curb to curb) within a 500 foot section, the Work shall include the paving of the City 500 foot section from curb to curb that encompasses existing patches within the City section.

2. FOR EXCAVATIONS OR CUTS ALONG THE LENGTH OF THE STREET WITHIN CITY RIGHT-OF-WAY:

a. In traffic lanes:

(1) Restoration width.

(a) Where the excavated area or cut is not more than fifty percent of the width of the City Right-of-Way the excavated area shall be patched (restored and resurfaced) and the patching shall extend to the next existing original paving joint, provided that patching shall always be no less than to the center of the wheel path in all lanes in which the excavation occurs.

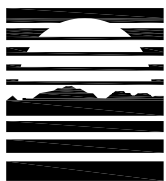
(b) Where the excavated area or cut is more than fifty percent of the width of the City Right-of-Way the excavated area shall be patched (restored and resurfaced) and the patching shall extend from curb to curb.

(2) All patching (restoration and resurfacing) shall include the application of an asphalt based sealer consisting of a blend of asphalt, selected mineral fillers and/or acrylics, designed specially to increase the life expectancy of asphalt pavements. The sealer shall be applied in accordance with the specifications in the Design Standards for Construction.

b. In parking and other lanes such as bike lanes.

Patching (restored and resurfaced) shall extend two feet from each side of the length of the excavation area or cut and patching to the curb or original paving joint, whichever is the greater distance, provided that patching shall always be not less than to the center of such lane, as shown in the illustrations in the DSC.

3. FOR EXCAVATIONS OR CUTS OF OTHER AREAS: The requirements for patching (restoration and resurfacing) other areas within the city parkway, including but not limited to sidewalk and curb repair, are set forth in the DSC.

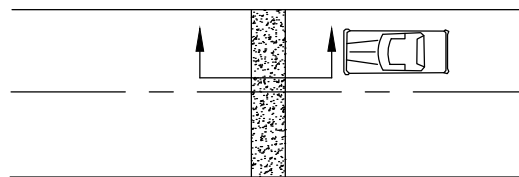
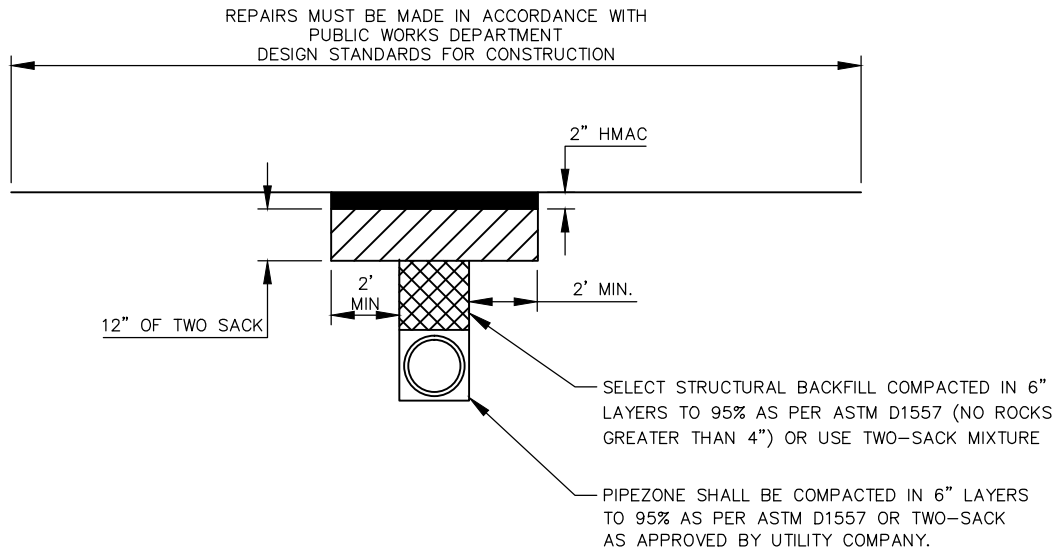


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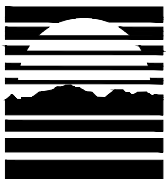
### SECTION 1 DESIGN STANDARDS FOR CONSTRUCTION

### PAVEMENT CUT TRENCH REPAIR 4-01

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



PLAN VIEW

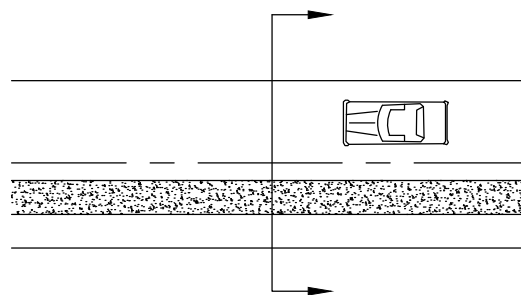
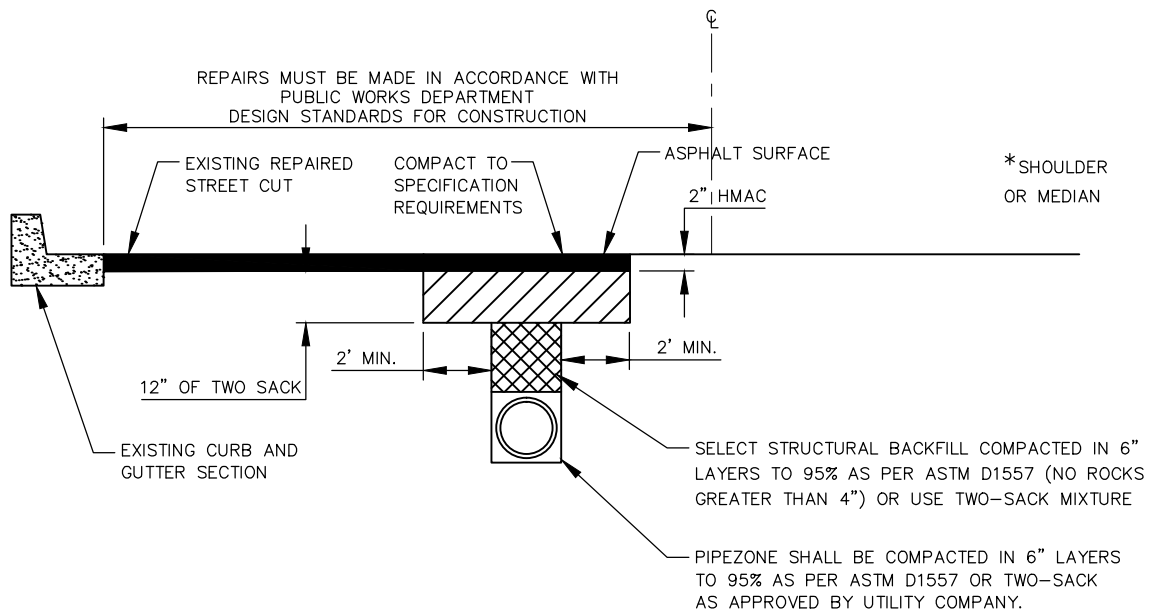


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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

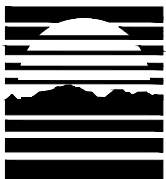
**PAVEMENT CUT  
TRENCH REPAIR  
4-02**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



PLAN VIEW

TRANSVERSE SECTION VIEW OF PARALLEL UTILITY CUT REPAIR

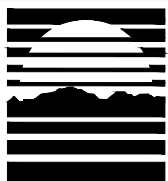
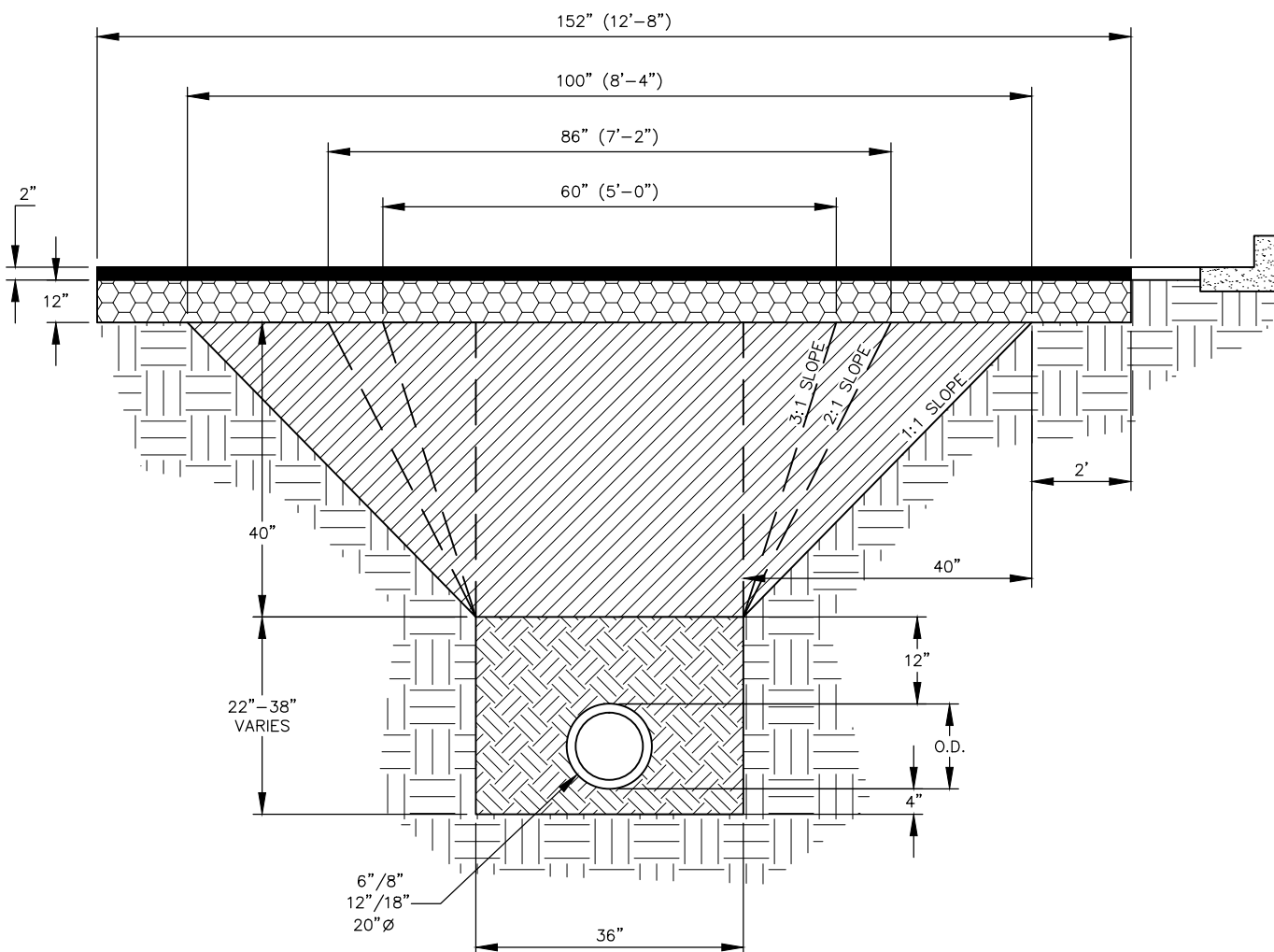


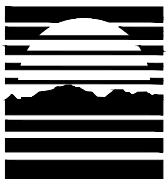
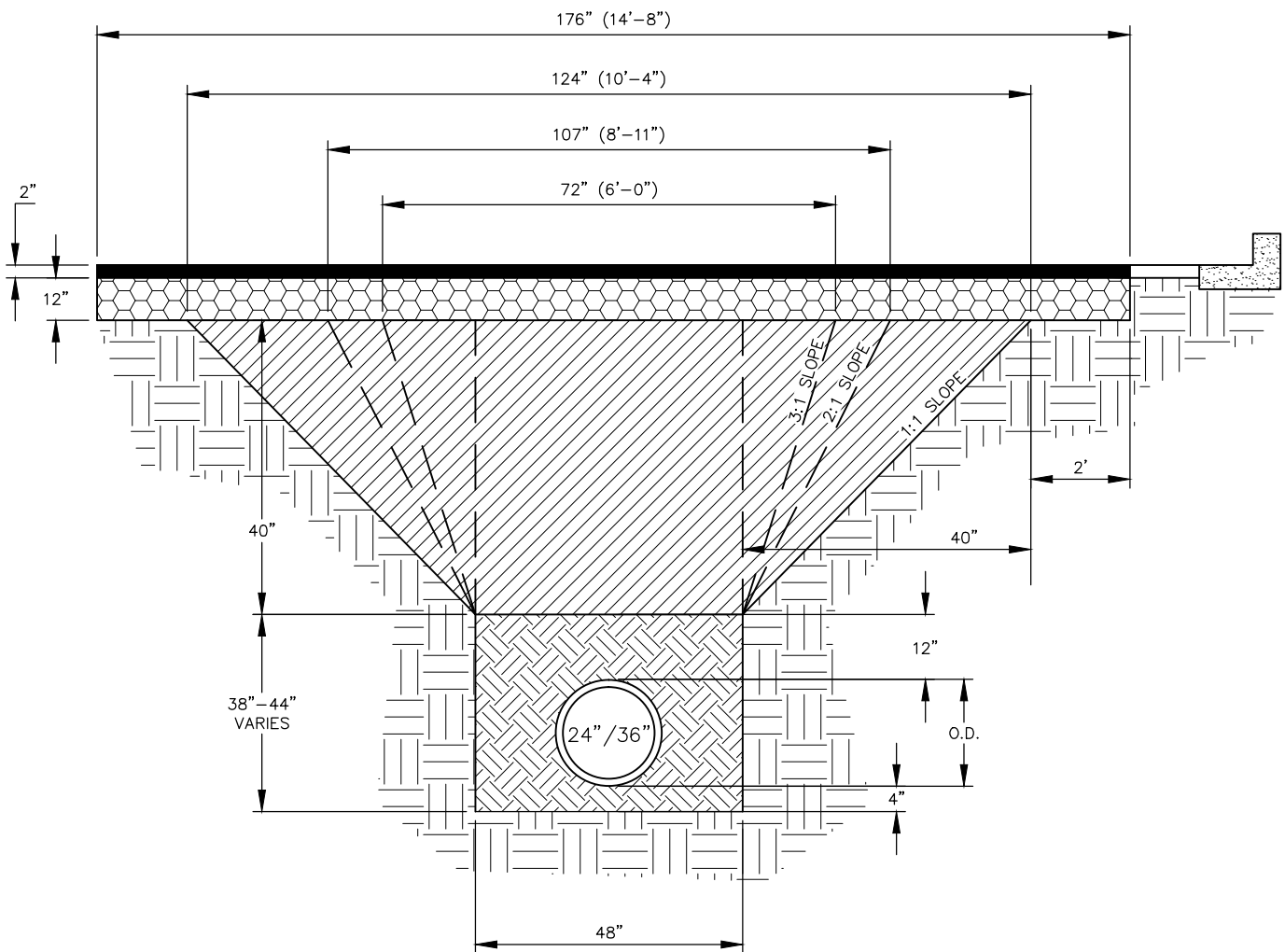
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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-03**

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DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

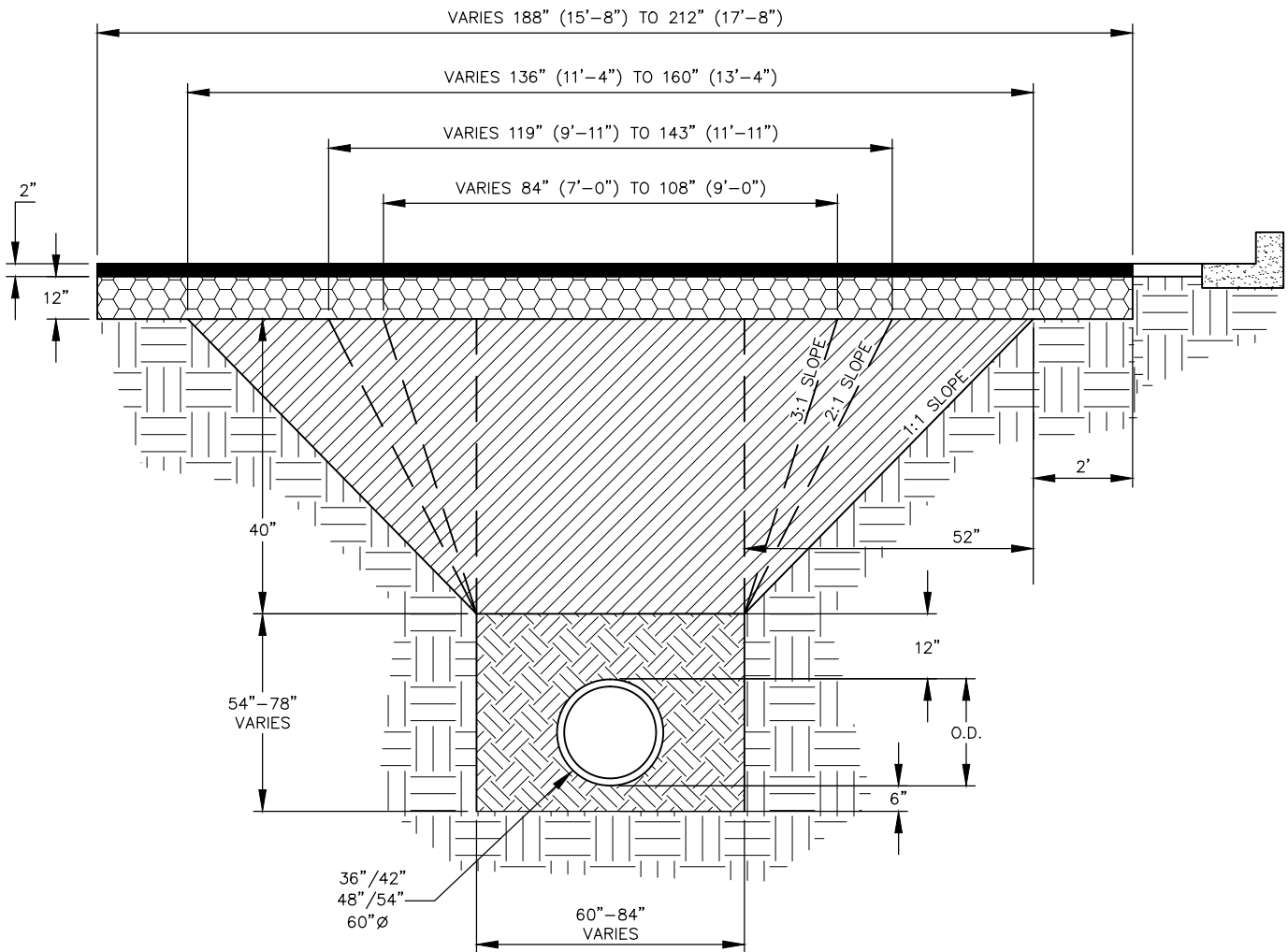




## SECTION 4

### DESIGN STANDARDS FOR CONSTRUCTION

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PAVEMENT REPLACEMENT TRENCH  
WIDTH AND PAVEMENT REPLACEMENT WIDTH  
DEPENDS ON SIZE OF PIPE AND SOIL TYPE



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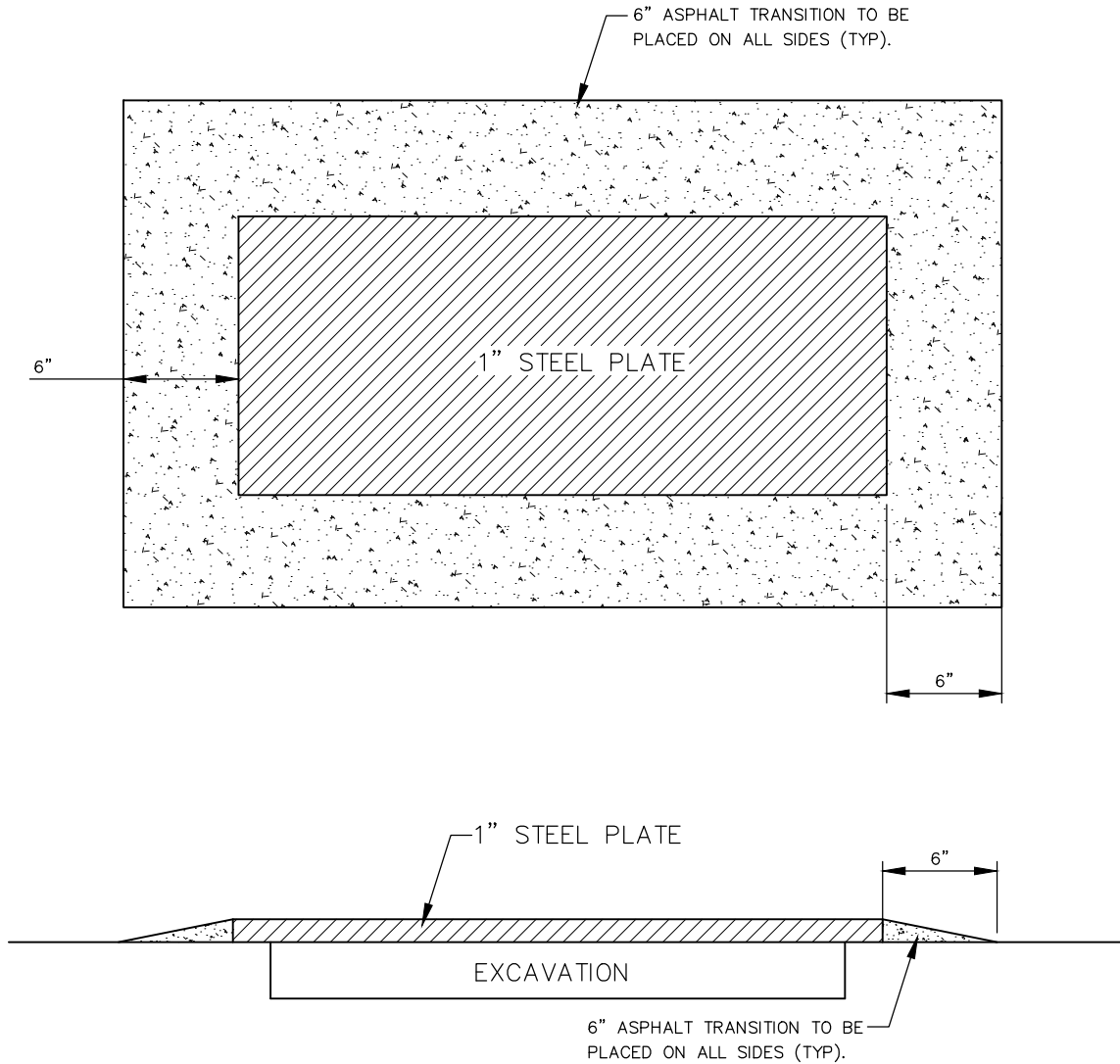
**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-06**

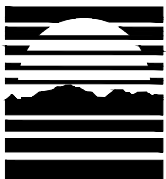
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
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## STEEL PLATES



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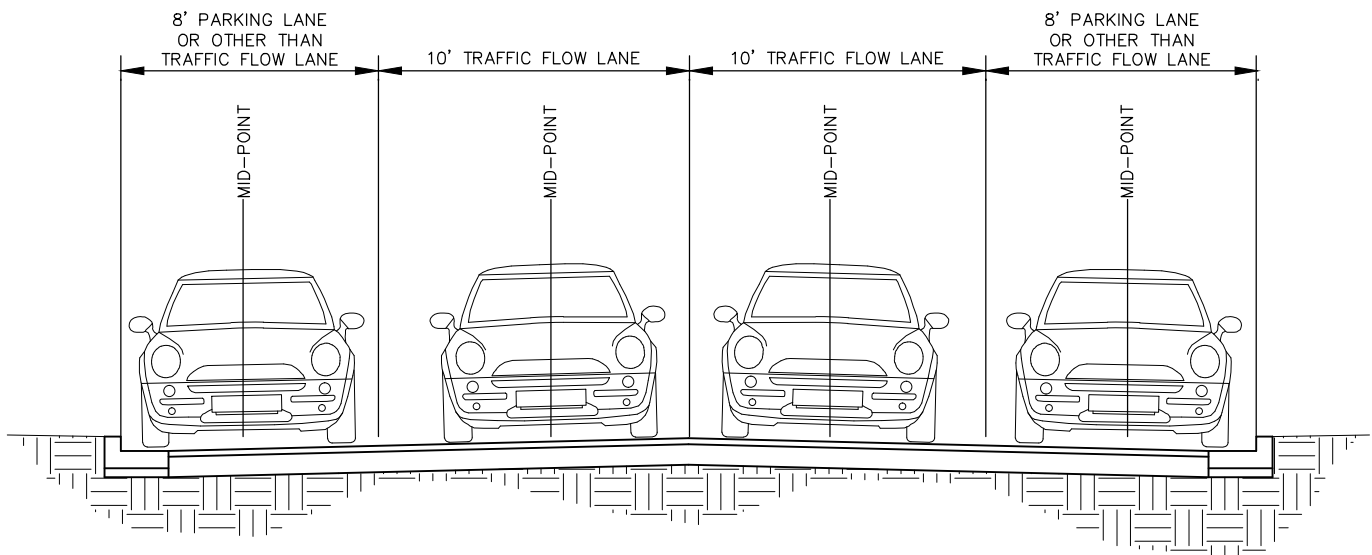


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### SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

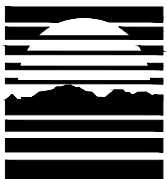
### PAVEMENT CUT TRENCH REPAIR 4-07

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



#### NOTES:

1. PAVING CUTS MADE WITHIN THE TRAFFIC FLOW LANE MUST BE REPAIRED BY PAVING FROM THE STREET CENTERLINE TO THE MID-POINT OF THE WHEEL PATH OR FROM THE MID-POINT OF THE WHEEL PATH TO THE OUTER EDGE OF THE TRAFFIC FLOW LANE.
2. PAVING CUTS MADE WITHIN THE PARKING LANE OR OTHER THAN TRAFFIC FLOW LANE MUST BE REPAIRED BY PAVING FROM THE MIDPOINT TO THE GUTTER OR FROM THE MIDPOINT TO THE TRAFFIC FLOW LANE.
3. THIS STANDARD APPLIES TO ALL STREET CROSS-SECTIONS AND WILL BE EVALUATED ON A CASE BY CASE BASIS.



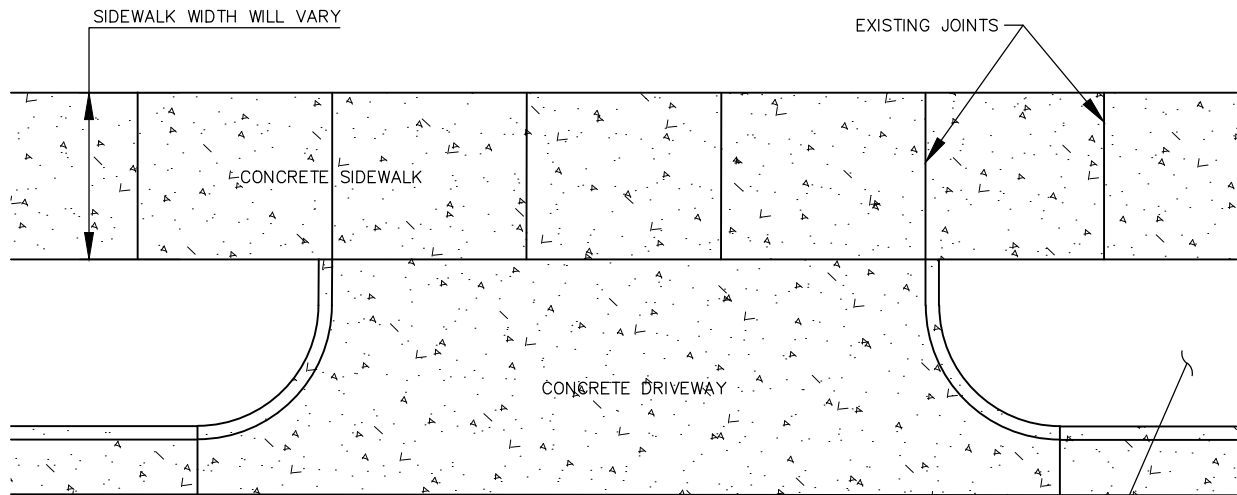
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#### SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

#### PAVEMENT CUT TRENCH REPAIR 4-08

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DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

# TYPICAL FOR UTILITY REPAIRS ON SIDEWALKS, DRIVEWAYS, AND PARKWAYS



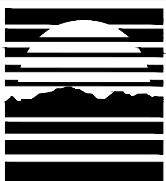
AREAS BETWEEN SIDEWALK AND CURB MUST BE RESTORED TO ITS ORIGINAL OR BETTER CONDITION. (TO INCLUDE IRRIGATION LINES AND LANDSCAPING)

## NOTES:

SIDEWALKS – REPLACE TO NEAREST JOINT. NO PATCHING WILL BE ALLOWED. REPLACEMENT MUST COMPLY WITH THE TOWN OF HORIZON CITY DESIGN STANDARDS FOR CONSTRUCTION.

DRIVEWAYS – REPLACE TO NEAREST EXPANSION JOINT OR ENTIRE SECTION. NO PATCHING WILL BE ALLOWED. REPLACEMENT MUST COMPLY WITH THE TOWN OF HORIZON CITY DESIGN STANDARDS FOR CONSTRUCTION.

EXCAVATIONS – EXCAVATION IN THE PARKWAY MUST BE COMPACTED IN ONE FOOT LIFTS TO 90% AS PER ASTM D1557.



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## SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

## PAVEMENT CUT TRENCH REPAIR 4-09

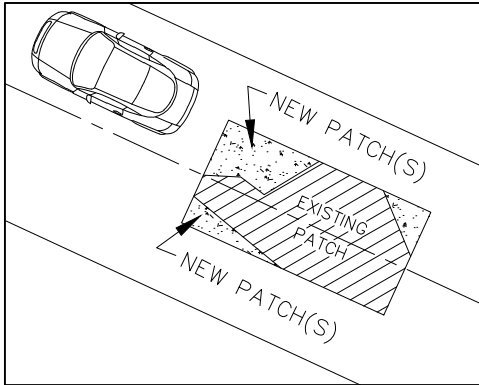
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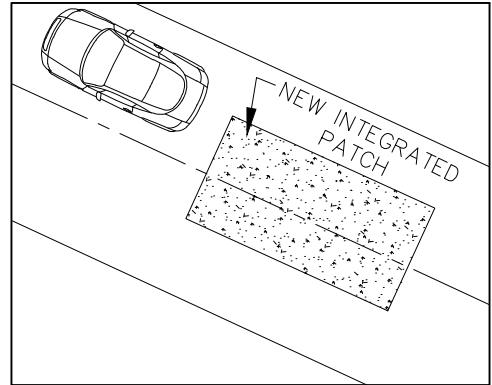
DRAWINGS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS-SECTION SHEETS FOR REPAIR PROCEDURES.

PATCH SLOPE AND GRADE MUST MATCH EXISTING PAVEMENT.

NOT ACCEPTABLE

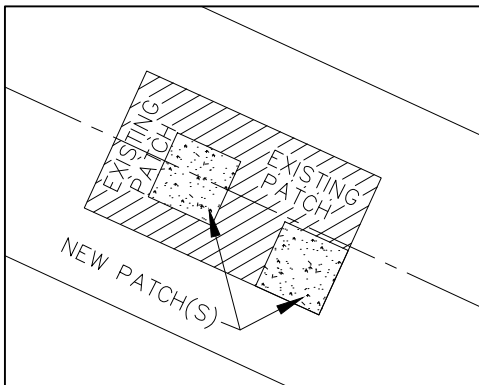


ACCEPTABLE

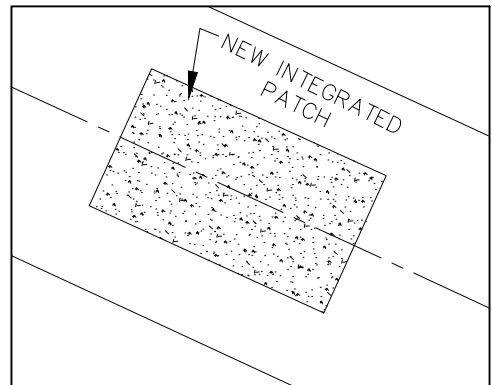


DO NOT CONSTRUCT PATCHES WITH ANGLED SIDES AND IRREGULAR SHAPES

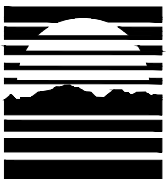
NOT ACCEPTABLE



ACCEPTABLE



PATCHES WITHIN EXISTING PATCHES ARE NOT ALLOWED



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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-10**

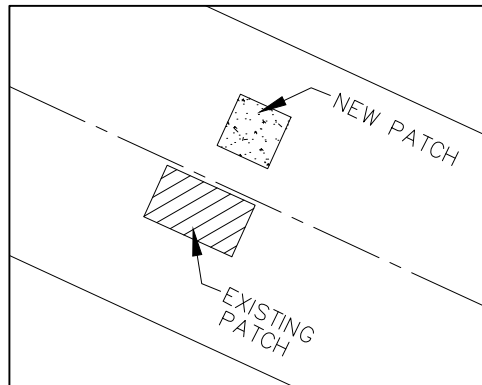
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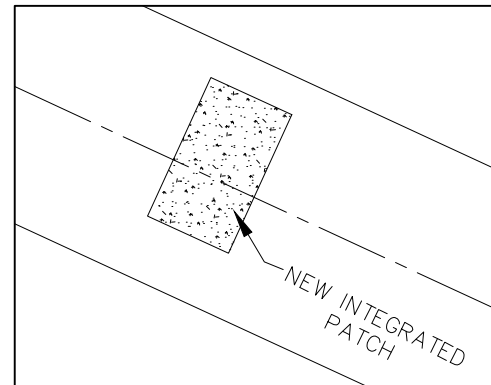
DRAWINGS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS-SECTION SHEETS FOR REPAIR PROCEDURES.

PATCH SLOPE AND GRADE MUST MATCH EXISTING PAVEMENT.

NOT ACCEPTABLE

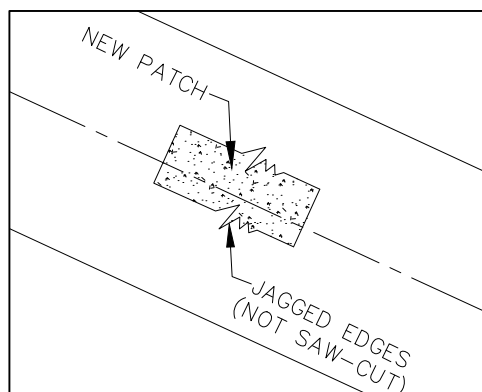


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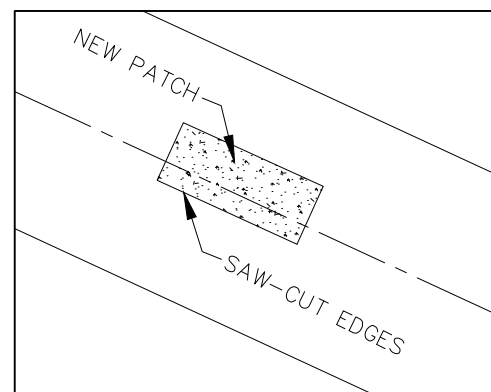


PATCH NO MORE THAN EIGHT FEET IN EACH DIRECTION

NOT ACCEPTABLE



ACCEPTABLE



ALL EDGES SHALL BE SAW CUT



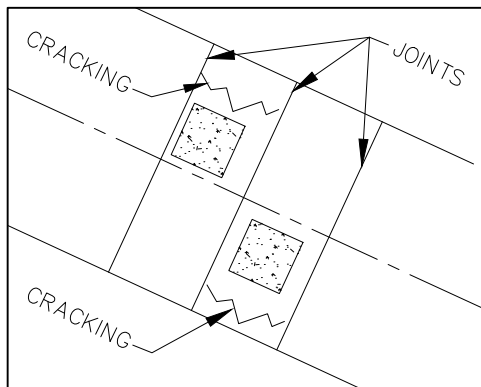
NOTE

DRAWINGS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS-SECTION SHEETS FOR REPAIR PROCEDURES.

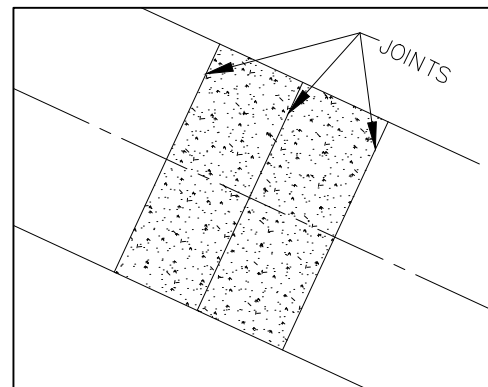
PATCH SLOPE AND GRADE MUST MATCH EXISTING PAVEMENT.

CONCRETE PAVEMENT

NOT ACCEPTABLE



ACCEPTABLE



IN CONCRETE PAVEMENTS, REMOVE SECTIONS TO EXISTING JOINTS

NOTE

CONCRETE PAVEMENT REPAIRS MUST MATCH EXISTING DESIGN OR AS DIRECTED BY THE CITY ENGINEER.

CONCRETE SHALL BE 4,000 P.S.I. @ 3 DAY HIGH EARLY STRENGTH.



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SECTION 4  
**DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-12**

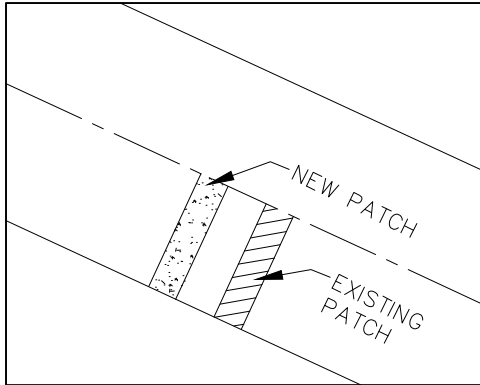
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
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NOTE

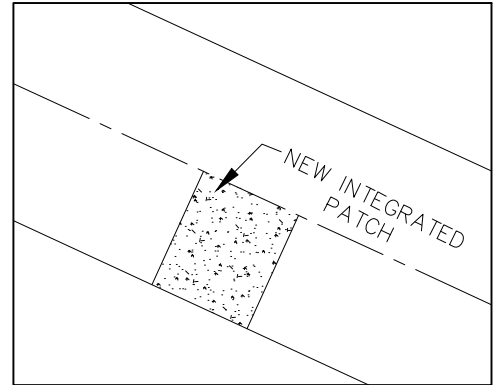
DRAWINGS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS-SECTION SHEETS FOR REPAIR PROCEDURES.

PATCH SLOPE AND GRADE MUST MATCH EXISTING PAVEMENT.

NOT ACCEPTABLE

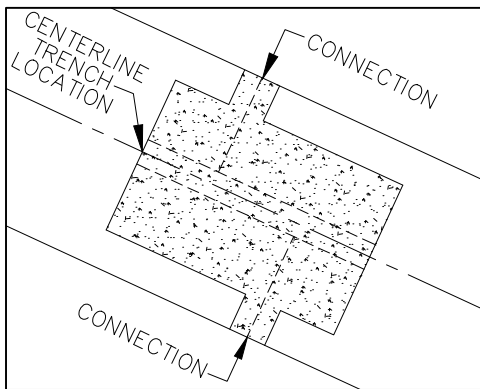


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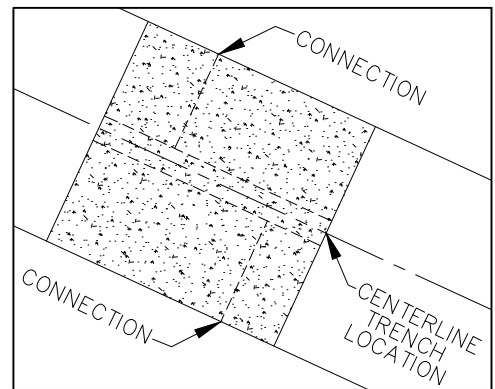


PATCH NO MORE THAN TEN FEET IN EACH DIRECTION.

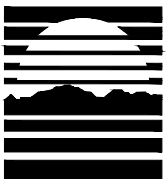
NOT ACCEPTABLE



ACCEPTABLE



PATCHES MUST AVOID FREQUENT WIDTH CHANGES.

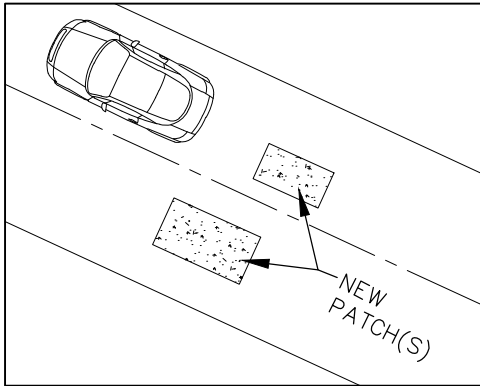


NOTE

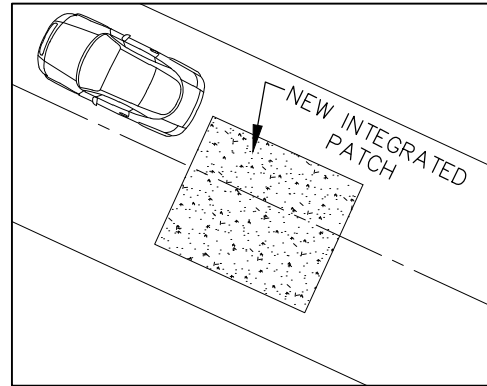
DRAWINGS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS-SECTION SHEETS FOR REPAIR PROCEDURES.

PATCH SLOPE AND GRADE MUST MATCH EXISTING PAVEMENT.

NOT ACCEPTABLE

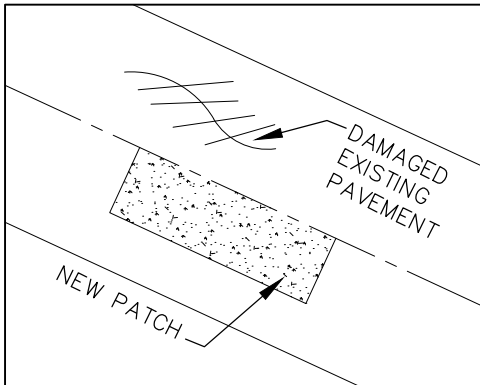


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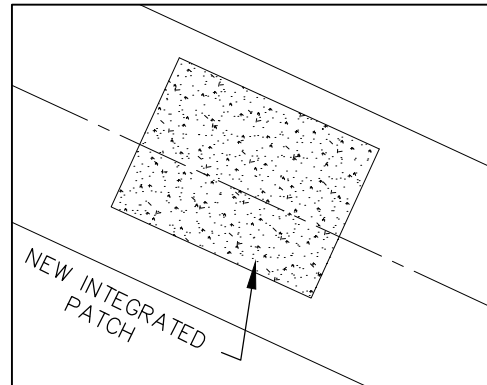


DO NOT ALLOW THE EDGES OF PATCHES TO FALL IN WHEEL PATHS

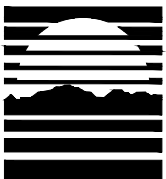
NOT ACCEPTABLE



ACCEPTABLE



DAMAGED PAVEMENT CAUSED BY CONTRACTOR'S EQUIPMENT  
MUST ALSO BE INCLUDED AS PART OF THE REPAIR.



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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-14**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

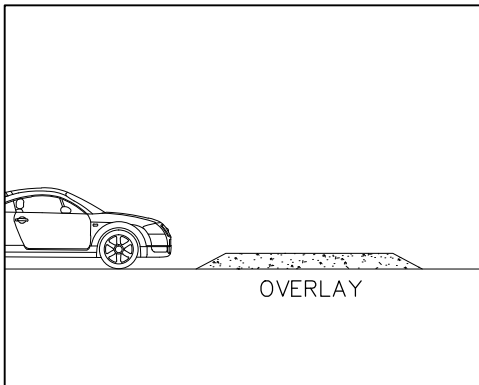


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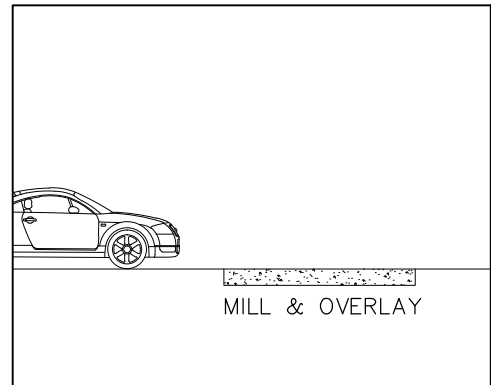
DRAWINGS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS-SECTION SHEETS FOR REPAIR PROCEDURES.

PATCH SLOPE AND GRADE MUST MATCH EXISTING PAVEMENT.

NOT ACCEPTABLE

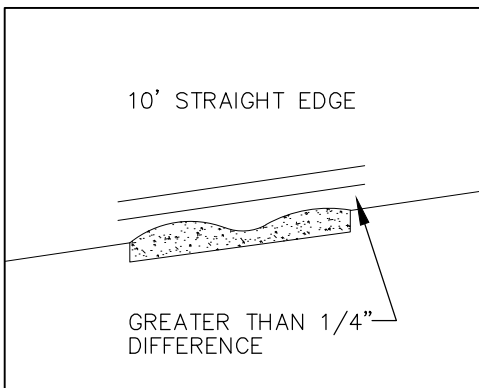


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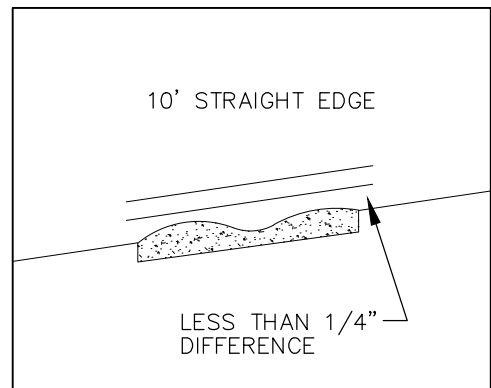


PATCHES MAY NOT DECREASE RIDEABILITY

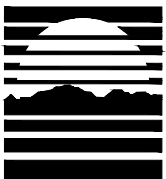
NOT ACCEPTABLE



ACCEPTABLE



SURFACE TOLERANCES FOR STREET REPAIRS SHALL MEET THE STANDARD FOR NEW CONSTRUCTION



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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-15**

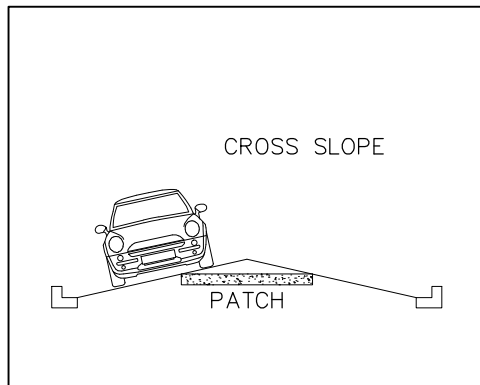
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

NOTE

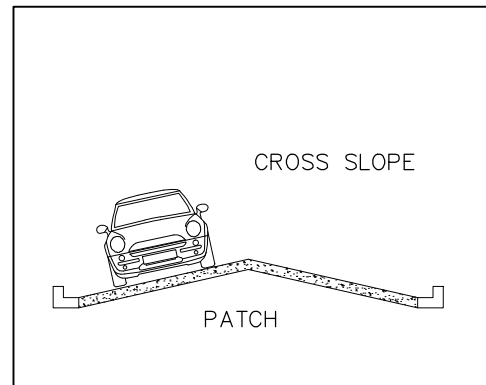
DRAWINGS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS-SECTION SHEETS FOR REPAIR PROCEDURES.

PATCH SLOPE AND GRADE MUST MATCH EXISTING PAVEMENT.

NOT ACCEPTABLE



ACCEPTABLE



PATCH SLOPE AND GRADE MUST MATCH EXISTING PAVEMENT

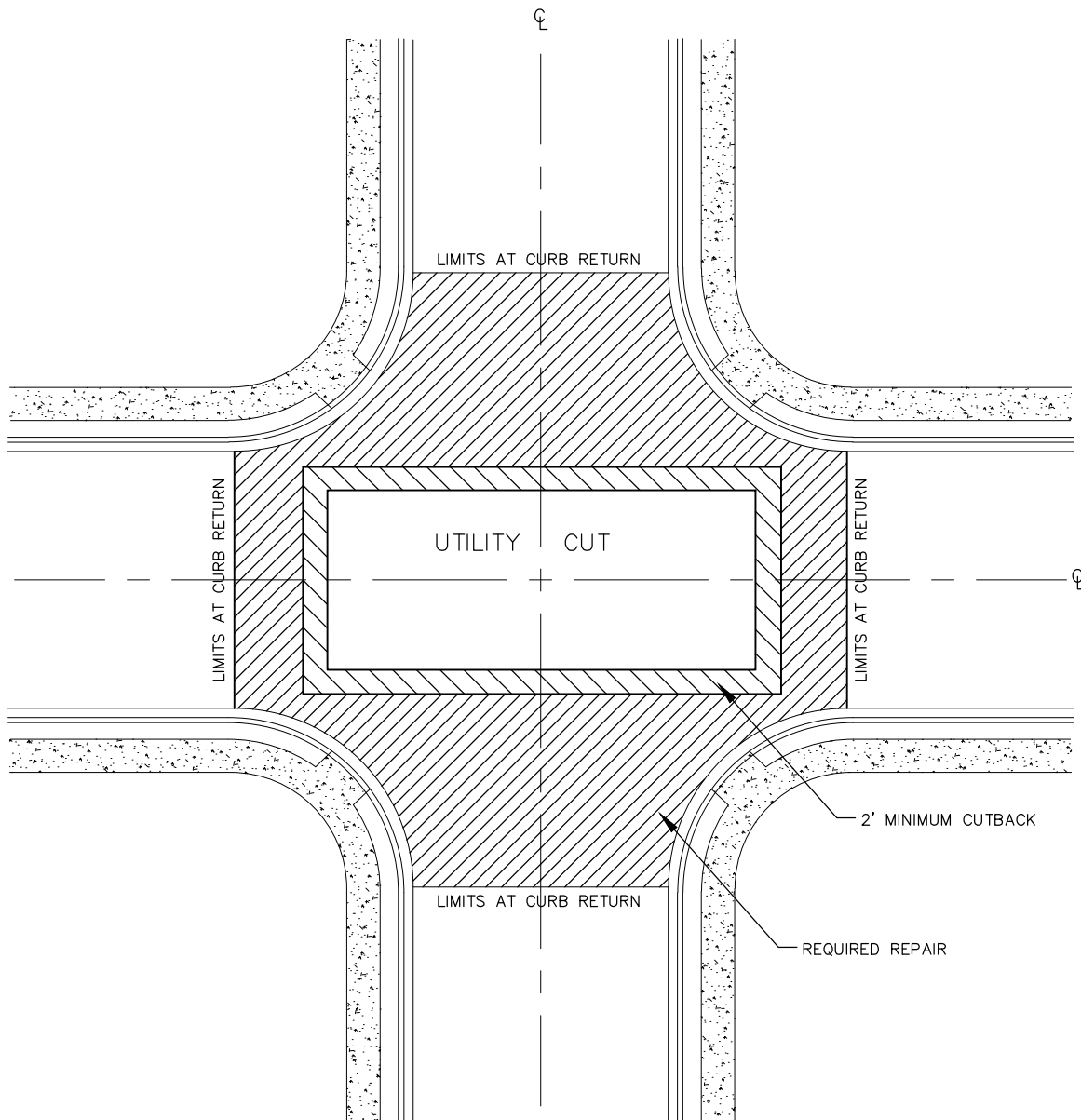


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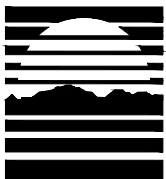
SECTION 4  
**DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-16**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



I:\PROJ\09012000 HORIZON CITY - GENERAL ORDINANCES\STANDARD DRAWINGS\DTLS-PAVEMENT\



# **TOWN OF HORIZON CITY**

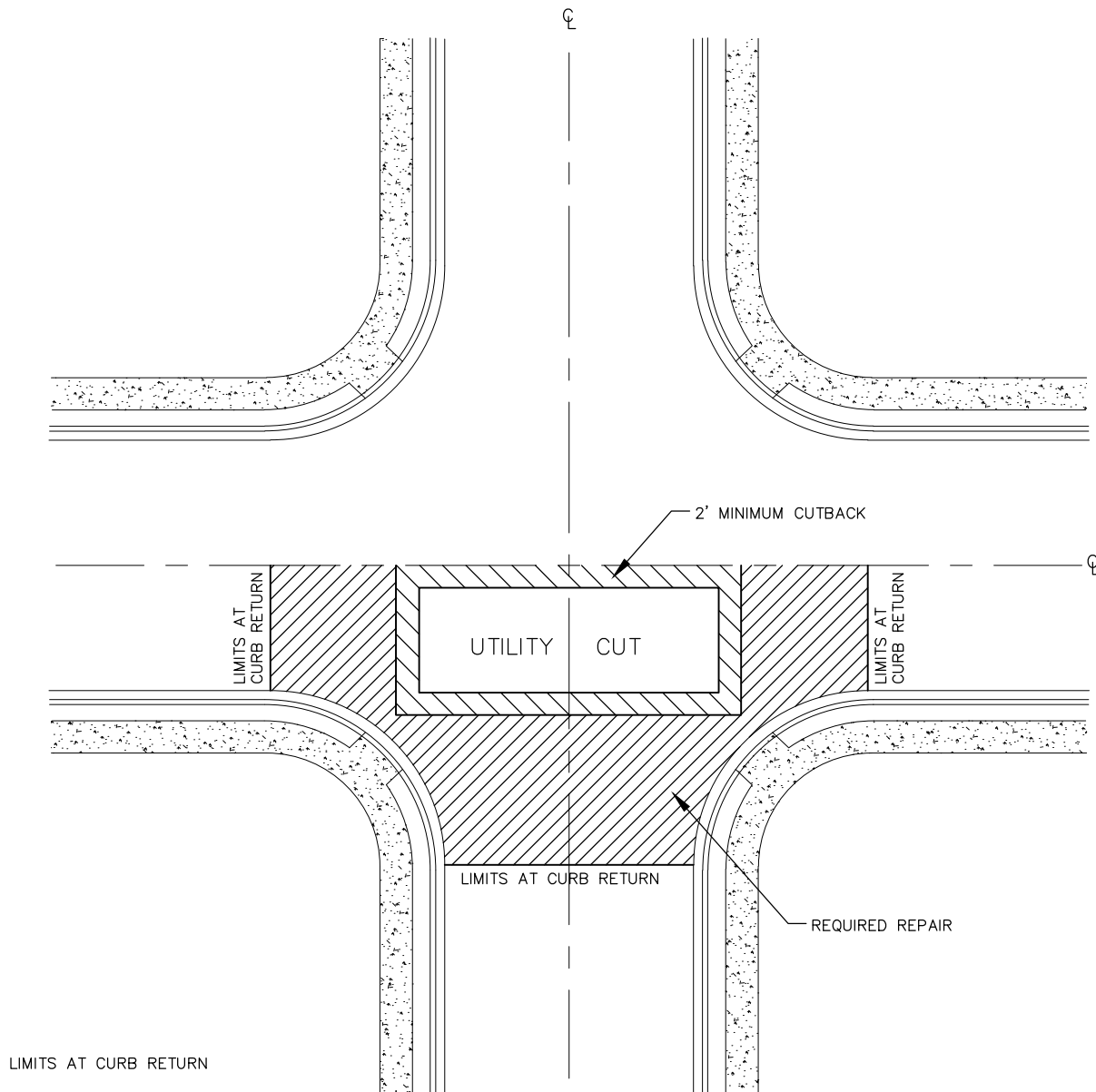
PUBLIC WORKS DEPARTMENT

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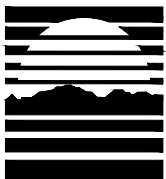
## **SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION**

## **PAVEMENT CUT TRENCH REPAIR 4-17**

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LIMITS AT CURB RETURN

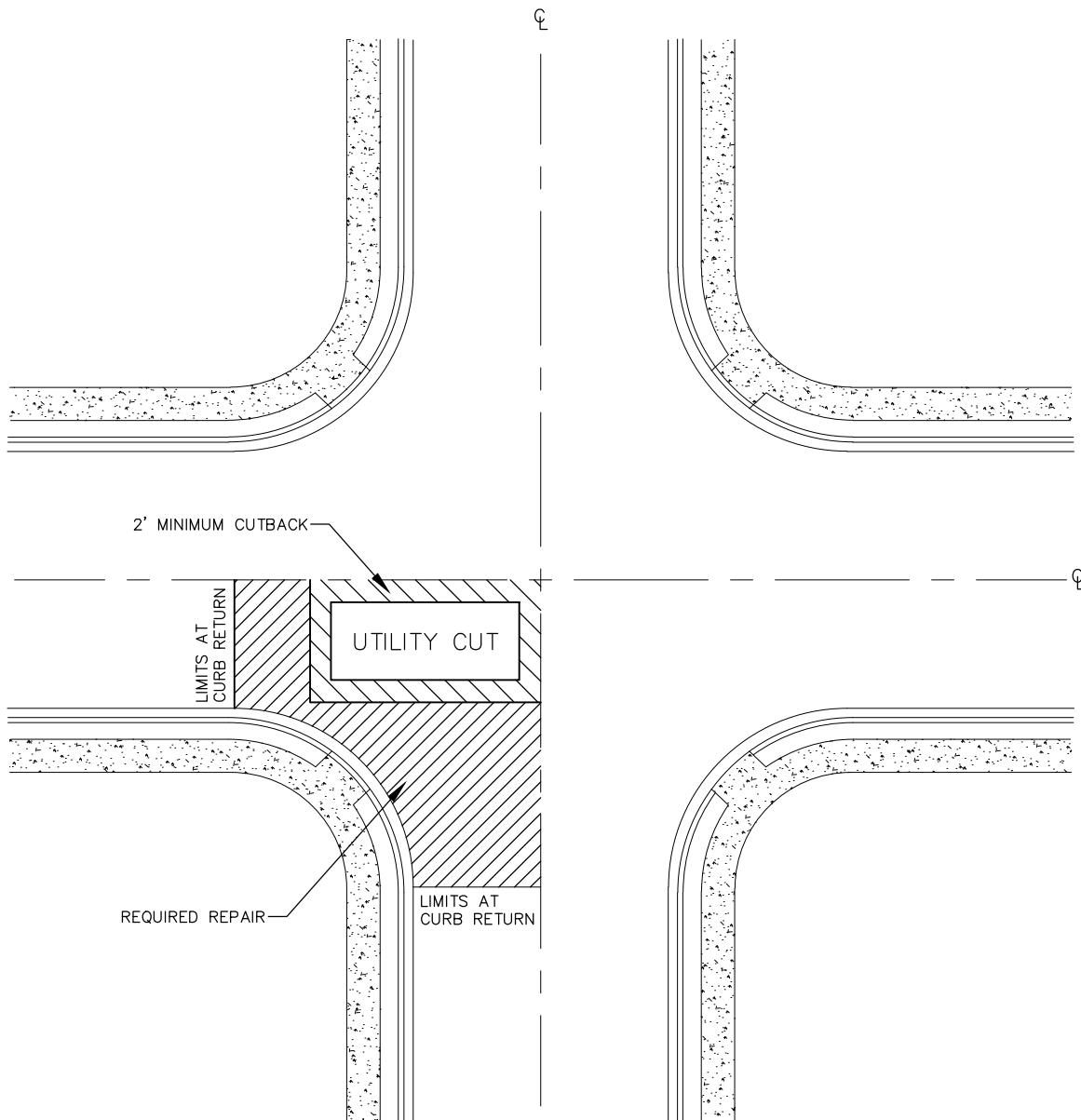


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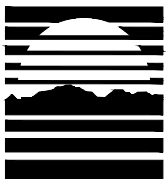
**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-18**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



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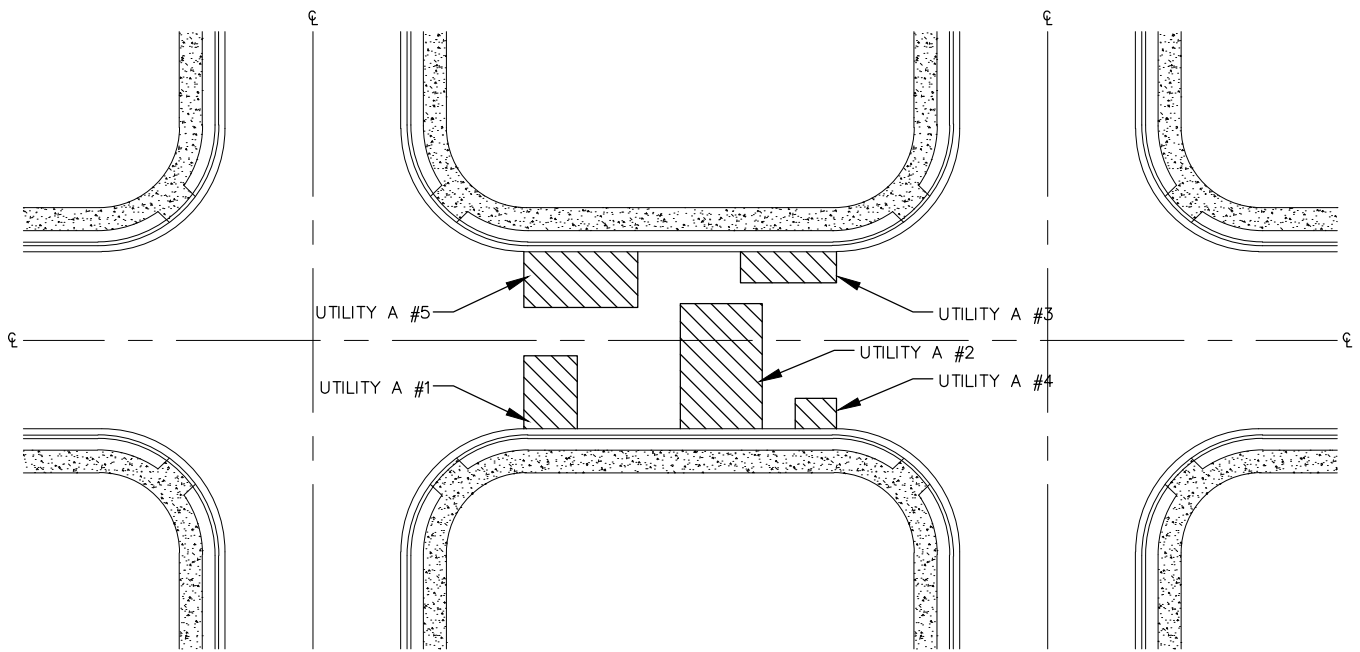


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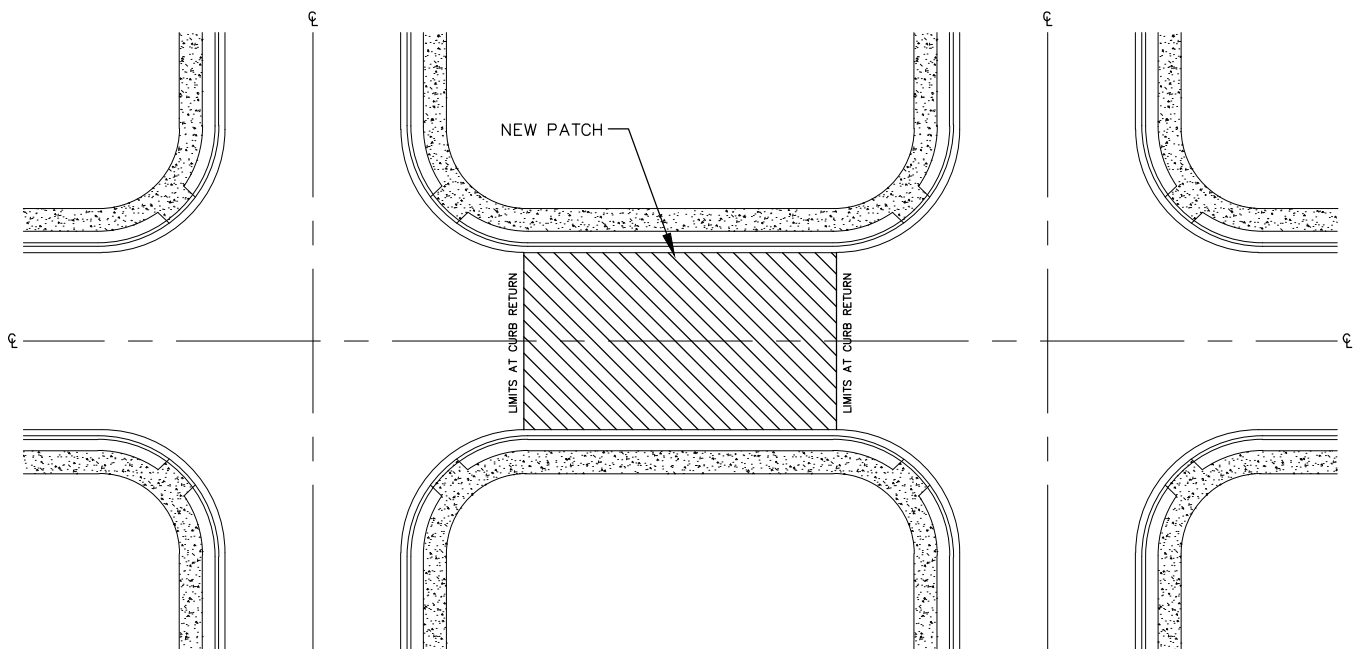
**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-19**

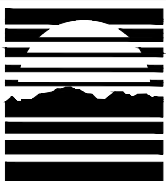
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



NOT ACCEPTABLE



ACCEPTABLE

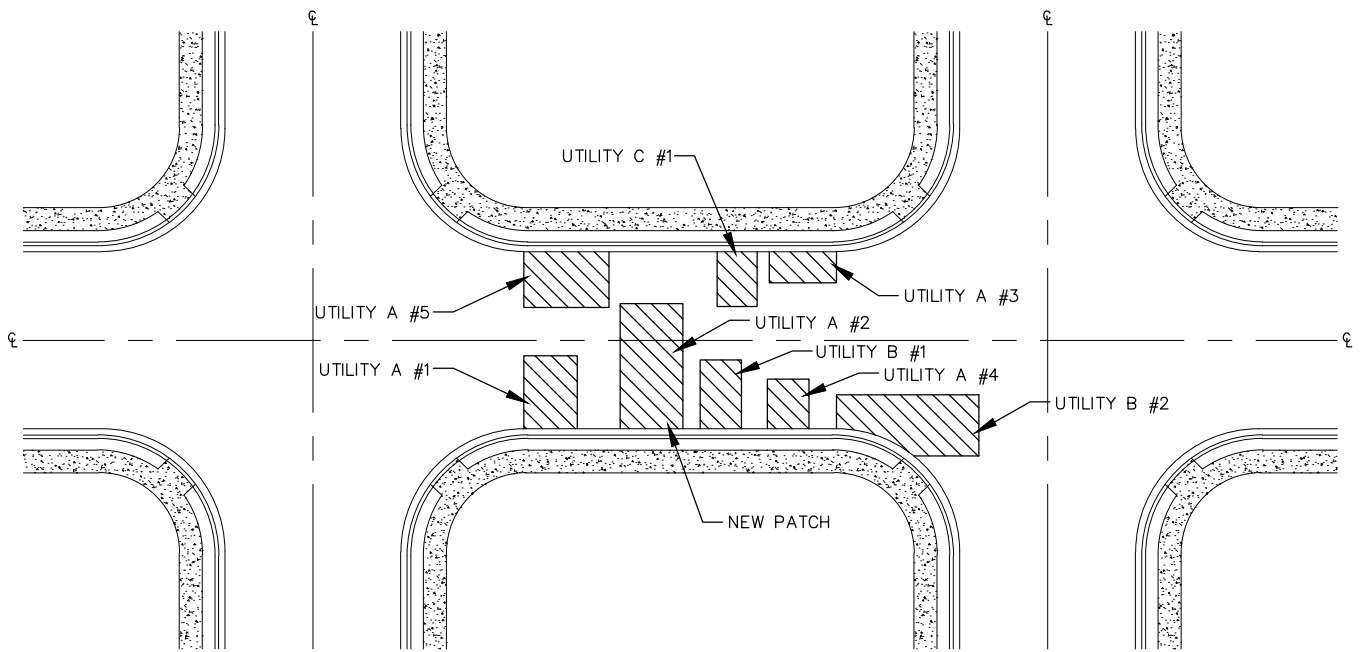


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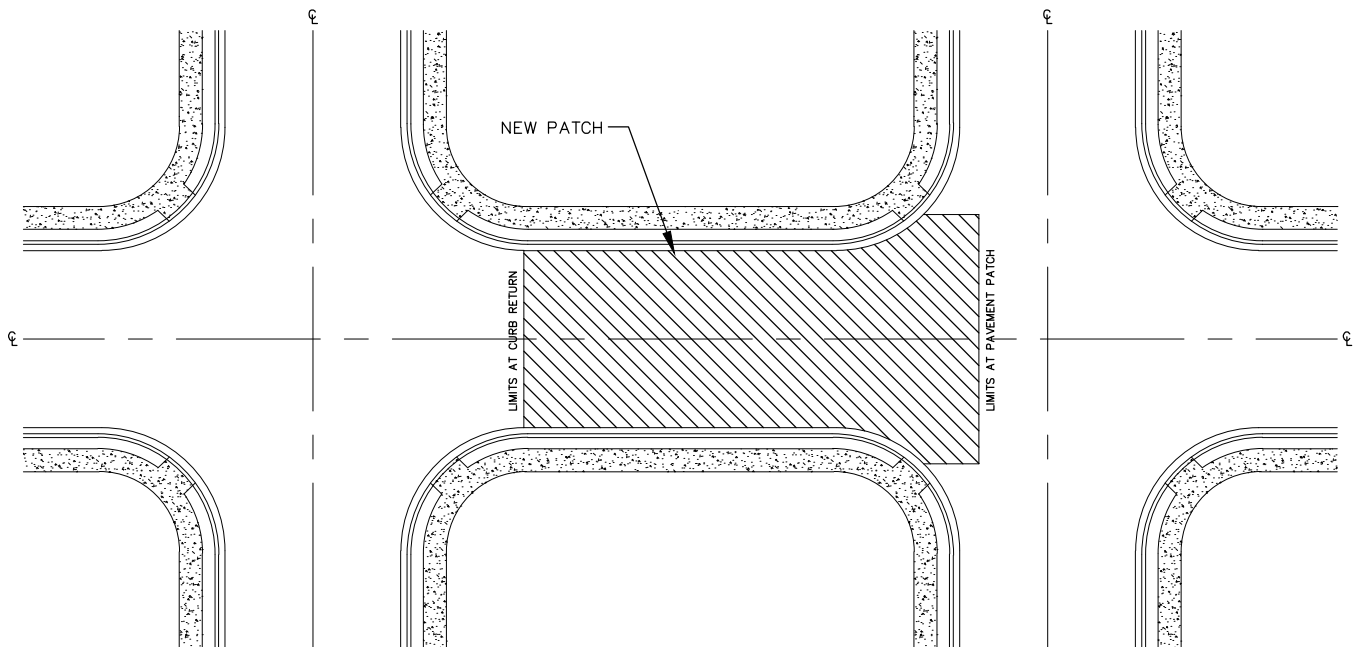
**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-20**

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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**PAVEMENT CUT  
TRENCH REPAIR  
4-21**

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## **SECTION 5**



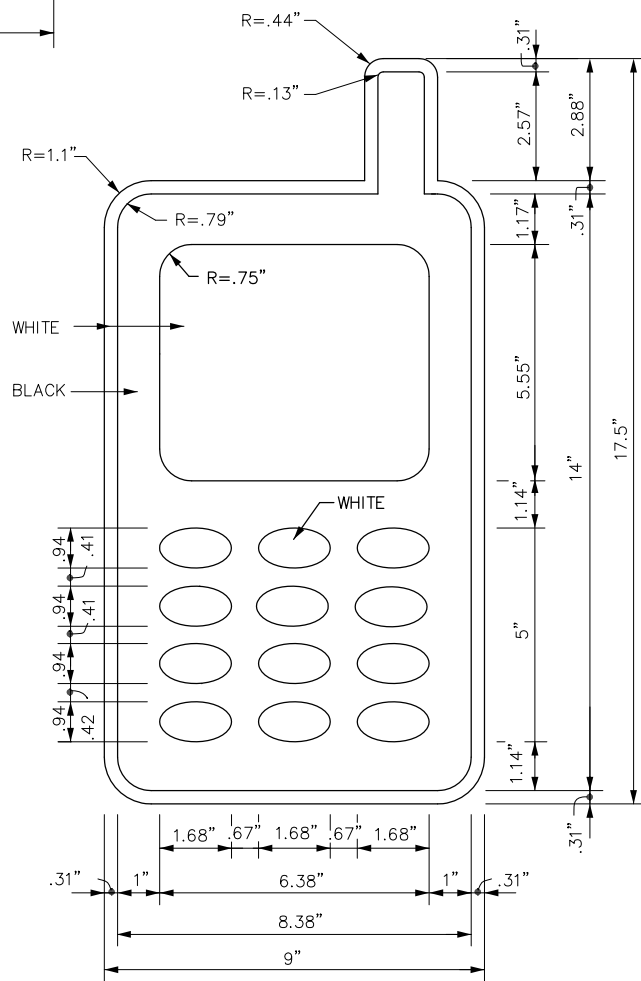


3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;  
 [STAY ALERT] Font: D  
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 [TALK OR TEXT LATER] Font: C specified length;

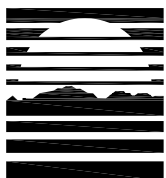
SIGN DETAIL (G20-10T)

WORKER SAFETY APPAREL NOTES:

- Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.



SIGN DETAIL (G20-10T)



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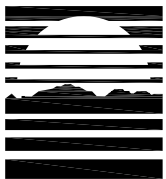
**SECTION 5  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**BARRICADE AND CONSTRUCTION  
GENERAL NOTES  
AND REQUIREMENTS  
5-01**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
 DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

## BARRICADE AND CONSTRUCTION STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
4. The Contractor is responsible for installing and maintaining the traffic control devices. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" where applicable or engineering judgment.
6. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
7. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
8. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
9. Traffic control devices should be in place only while work is actually in progress or a definite need exists.
10. The Engineer has the final decision on the location of all traffic control devices.
11. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.



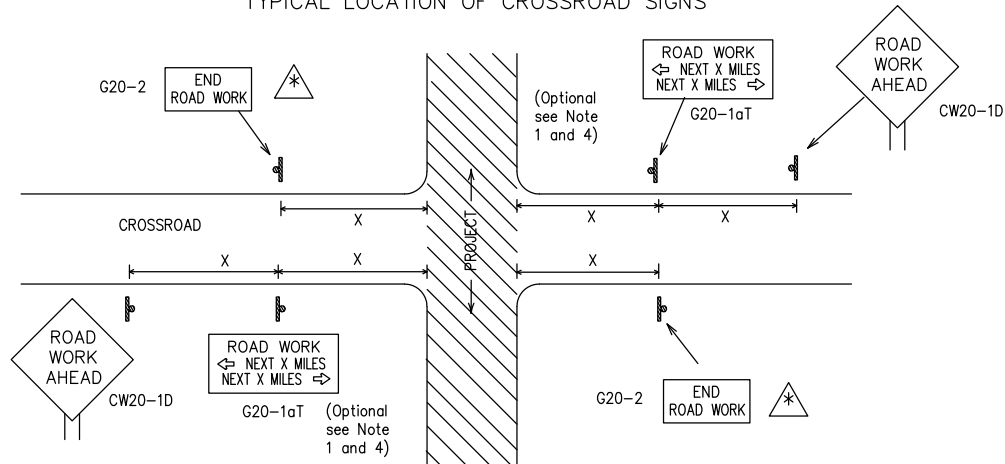
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### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

### BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS 5-02

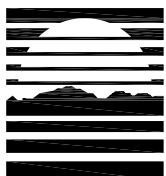
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

# TYPICAL LOCATION OF CROSSROAD SIGNS



 May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets. Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. When work occurs in the intersection area, appropriate traffic control devices, as determined by the Engineer/Inspector, shall be in place.



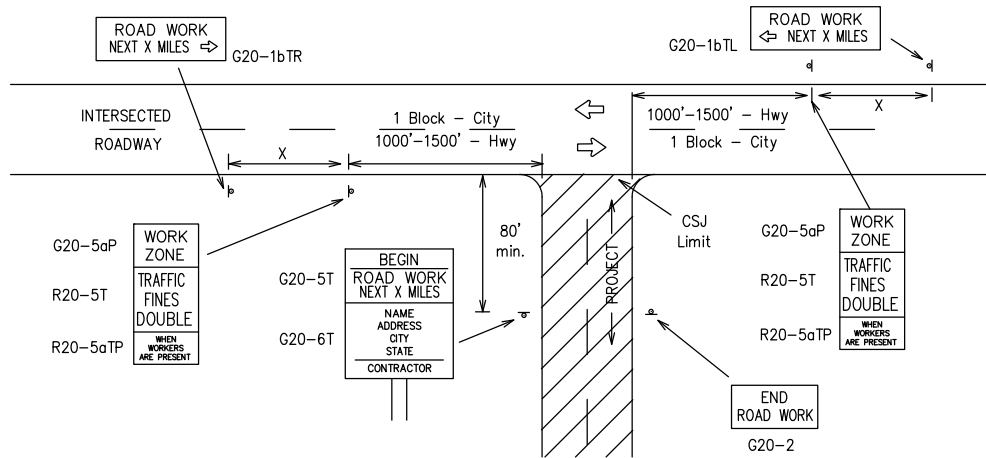
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## **SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION**

**BARRICADE AND CONSTRUCTION  
PROJECT LIMIT  
5-03**

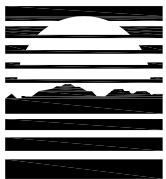
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

## T-INTERSECTION



## LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing.



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## SECTION 5

### DESIGN STANDARDS FOR CONSTRUCTION

BARRICADE AND CONSTRUCTION  
PROJECT LIMIT  
5-04

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

# TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING <sup>1,5,6</sup>

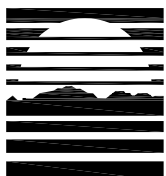
SIZE		SPACING	
Sign Number or Series	Conventional Road	Posted Speed	Sign Spacing "X" <sup>Δ</sup>
CW20 <sup>4</sup> CW21 CW22 CW23 CW25	48" x 48"	MPH	Feet (Apprx.)
		30	120
		35	160
		40	240
		45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	50	400
		55	500 <sup>2</sup>
		60	600 <sup>2</sup>
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	65	700 <sup>2</sup>
		70	800 <sup>2</sup>
		75	900 <sup>2</sup>
		80	1000 <sup>2</sup>
		*	* <sup>3</sup>

\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

Δ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

## GENERAL NOTES

1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

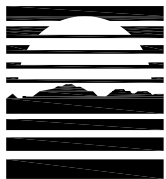


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## SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
PROJECT LIMIT  
5-05**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI-STAFF



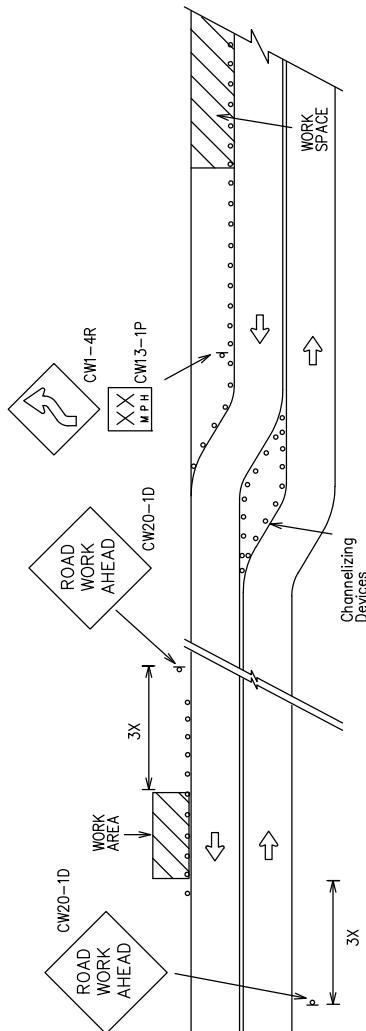
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**SECTION 5  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**BARRICADE AND CONSTRUCTION  
PROJECT LIMIT  
5-06**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

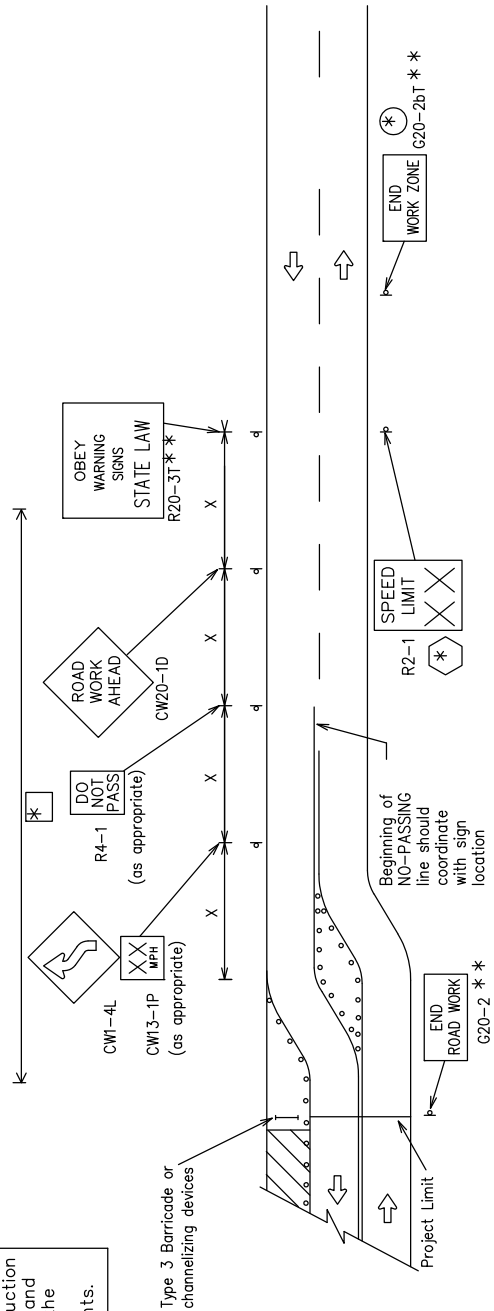
**WORK AREAS IN MULTIPLE LOCATIONS**



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

LEGEND	
—	Type 3 Barricade
○ ○ ○	Channelizing Devices
+	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE REPAIR LIMITS**



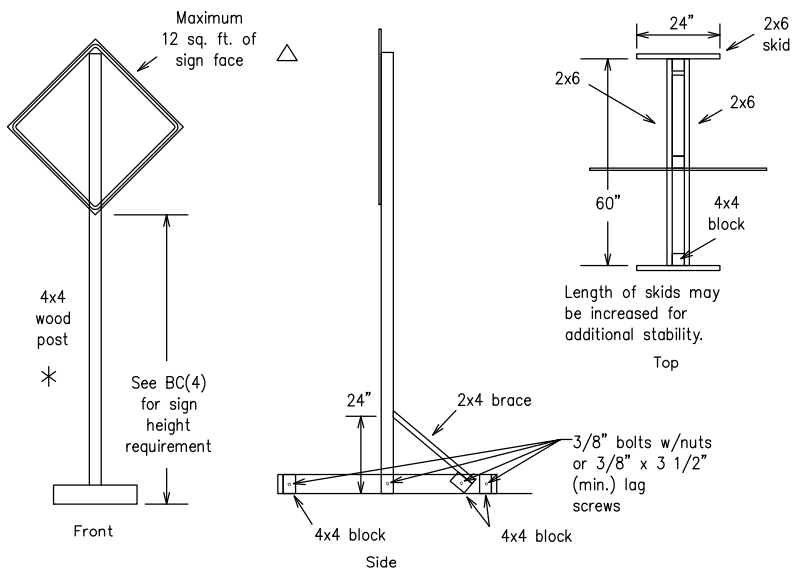
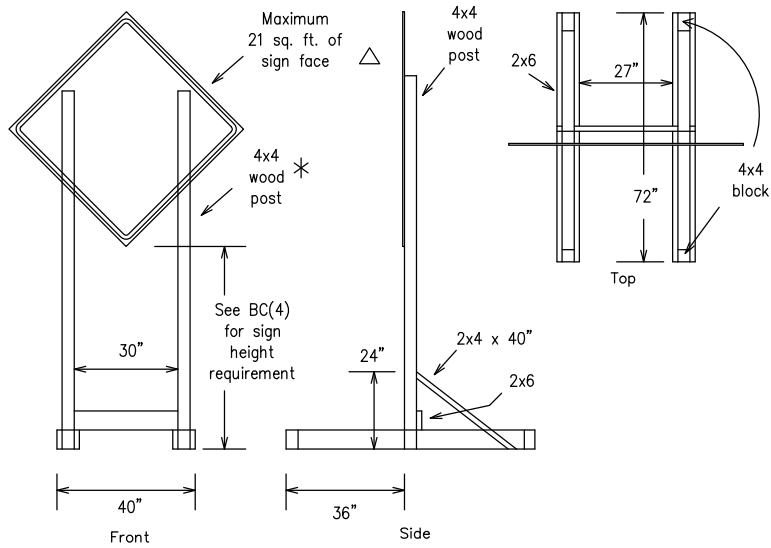
**NOTES**

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

(\*) The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the Project Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the Project Limits where traffic fines may double if workers are present.

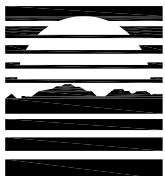
(\*) Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.

(\*) Contractor will install a regulatory speed limit sign at the end of the work zone.



## SKID MOUNTED WOOD SIGN SUPPORTS

LONG/INTERMEDIATE TERM STATIONARY – PORTABLE SKID MOUNTED SIGN SUPPORTS □

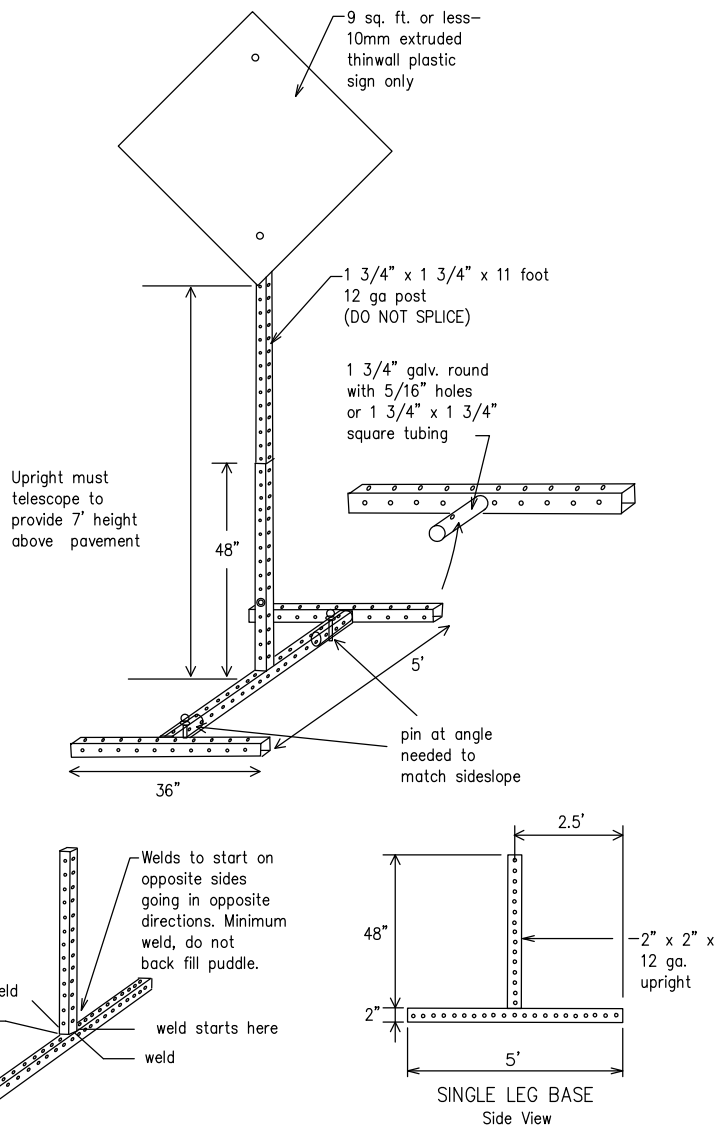


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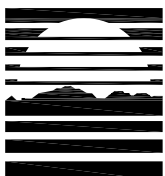
### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
TYPICAL SIGN SUPPORT  
5-07**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



## SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS



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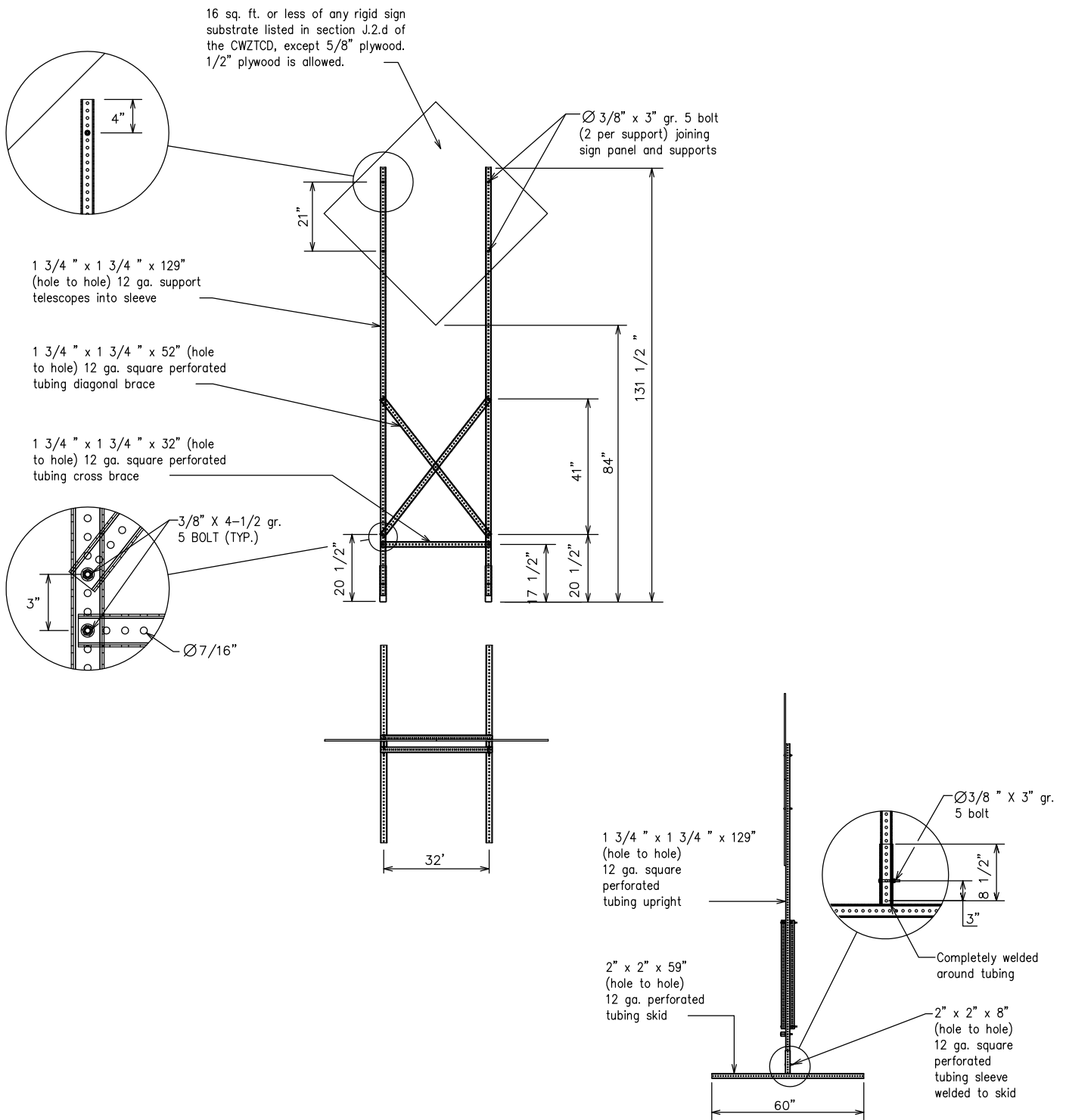
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### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

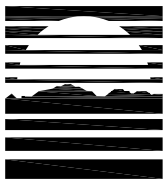
### BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT 5-08

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF





## SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS



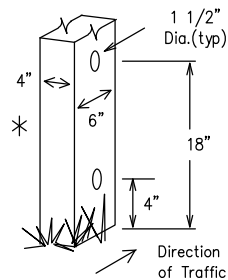
**TOWN OF  
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### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
TYPICAL SIGN SUPPORT  
5-09**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

## WEDGE ANCHORS



Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

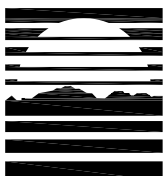
Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer.

### GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site.

- \* Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- △ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

## SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS



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### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
TYPICAL SIGN SUPPORT  
5-10**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

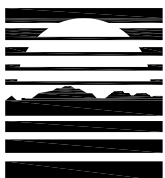
WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

#### PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLRS
High-Occupancy	HOV	Tuesday	TUES
Vehicle	HWY	Time Minutes	TIME MIN
Highway	HR, HRS	Upper Level	UPR LEVEL
Hour(s)	INFO	Vehicles (s)	VEH, VEHS
Information	ITS	Warning	WARN
It Is	JCT	Wednesday	WED
Junction	LFT	Weight Limit	WT LIMIT
Left	LFT LN	West	W
Left Lane	LN CLOSED	Westbound	(route) W
Lane Closed	LWR LEVEL	Wet Pavement	WET PVMT
Lower Level	MAINT	Will Not	WONT
Maintenance			

Roadway designation # IH=number, US=number, SH=number, FM=number



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## SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
PORTABLE CHANGEABLE  
MESSAGE SIGN (PCMS)**  
**5-11**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI-STAFF

RECOMMENDED PHASES AND FORMATS FOR PCMS  
MESSAGES DURING ROADWORK ACTIVITIES  
(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

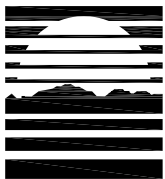
Road/Lane/Ramp Closure List

ROAD CLSD AT FM XXXX	SHOULDER CLOSED XXX FT
RIGHT X LANES CLOSED	RIGHT LN CLOSED XXX FT
CENTER LANE CLOSED	RIGHT X LANES OPEN
NIGHT LANE CLOSURES	DAYTIME LANE CLOSURES
VARIOUS LANES CLOSED	RIGHT LN TO BE CLOSED
XXXXXXXX BLVD CLOSED	X LANES CLOSED TUE – FRI

Other Condition List

ROADWORK XXX FT	ROAD REPAIRS XXXX FT
FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
DETOUR X MILE	ROUGH ROAD XXXX FT
BUMP XXXX FT	ROADWORK NEXT FRI–SUN
TRAFFIC SIGNAL XXXX FT	LANES SHIFT *

\* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

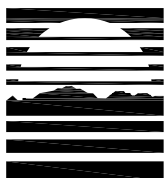


RECOMMENDED PHASES AND FORMATS FOR PCMS  
MESSAGES DURING ROADWORK ACTIVITIES  
(The Engineer may approve other messages not specifically covered here.)

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM-X PM
DETOUR NEXT X EXITS	WATCH FOR TRUCKS	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
WATCH FOR TRUCKS	EXPECT DELAYS	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
EXPECT DELAYS	PREPARE TO STOP	XXXXXXX TO XXXXXXX	ADVISORY SPEED XX MPH	BEGINS MAY XX
REDUCE SPEED XXX FT	END SHOULDER USE		RIGHT LANE EXIT	MAY X-X XX PM - XX AM
USE OTHER ROUTES	WATCH FOR WORKERS		USE CAUTION	NEXT FRI-SUN
STAY IN LANE *			DRIVE SAFELY	XX AM TO XX PM
			DRIVE WITH CARE	NEXT TUE AUG XX
				TONIGHT XX PM-XX AM

\* \* See Application Guidelines Note 6.



#### APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

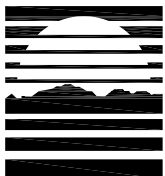
#### WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

#### FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.



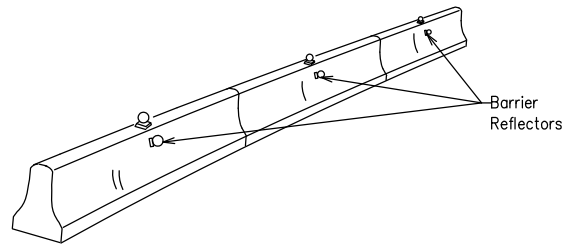
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### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
PORTABLE CHANGEABLE  
MESSAGE SIGN (PCMS)  
5-14**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

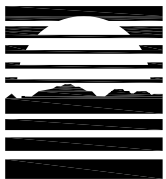
1. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to this item.



CONCRETE TRAFFIC BARRIER (CTB)

2. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
3. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
4. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
5. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
6. Maximum spacing of Barrier Reflectors is forty (40) feet.
7. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
8. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
9. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
10. Single slope barriers shall be delineated as shown on the above detail.

## BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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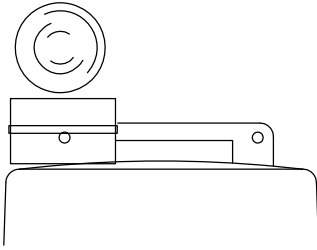
### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
ARROW PANEL, REFLECTORS,  
WARNING LIGHTS & ATTENUATOR  
5-15**

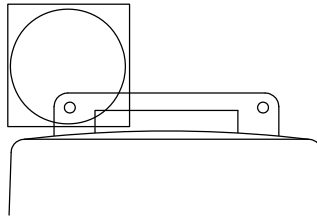
APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

### WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A—Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B<sub>FL</sub> or C<sub>FL</sub>.
4. Type—C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on the sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady—Burn Warning Lights.
7. When used to delineate curves, Type—C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

### WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

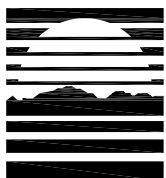
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady—burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

### WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one—side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300—Type B or Type C.
7. When used near two—way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

### TRUCK—MOUNTED ATTENUATORS

1. Truck—mounted attenuators (TMA) used on Town of Horizon facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
5. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



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## **SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION**

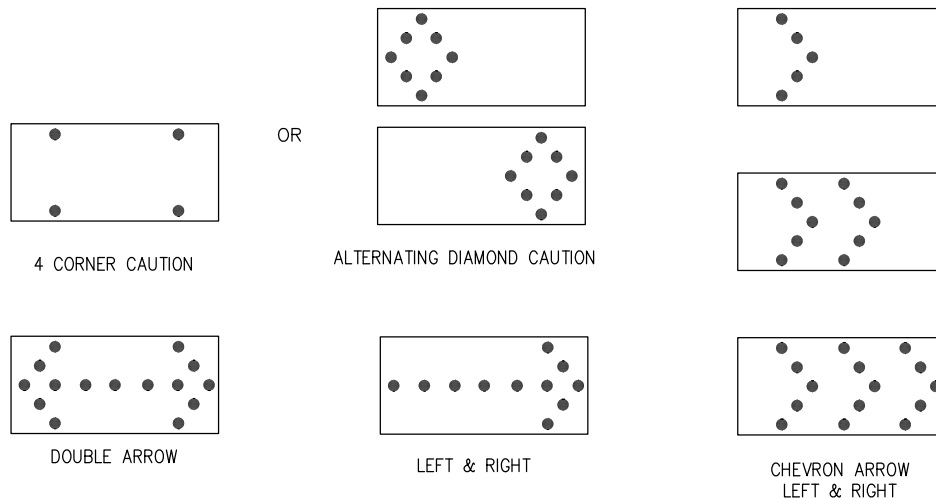
## **BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR 5-16**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI-STAFF



Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



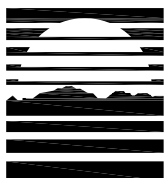
5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the standard; however, the sequential Chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

## FLASHING ARROW BOARDS



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### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
ARROW PANEL, REFLECTORS,  
WARNING LIGHTS & ATTENUATOR  
5-17**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI-STAFF

## GENERAL NOTES

1. For long term stationary work zones, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

## GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

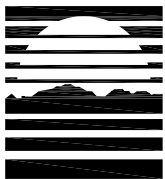
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

## RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of TxDOT's Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

## BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

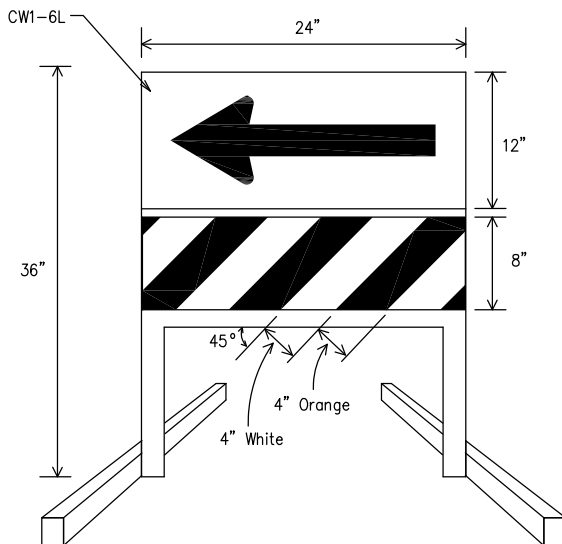
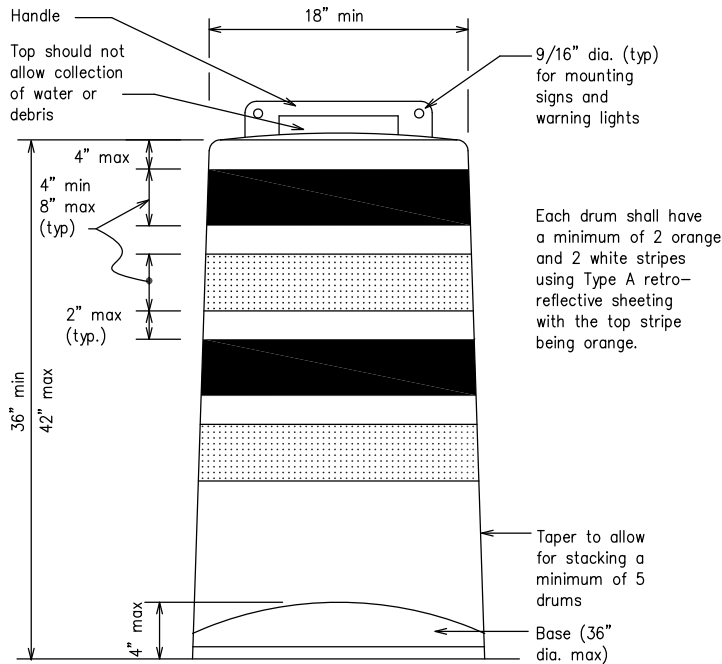


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## SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

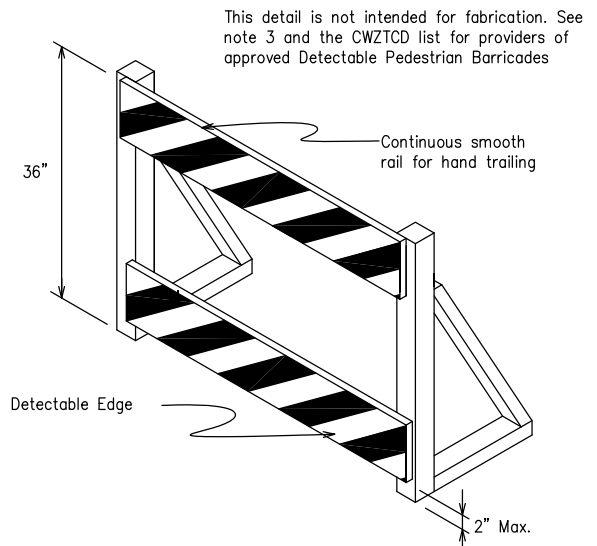
## BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES 5-18

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DATE: SEPT. 25, 2017 DRAWN BY: HZI-STAFF



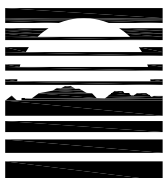
#### DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B or Type C Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List.  
Ballast shall be as approved by the manufacturers instructions.



#### DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.

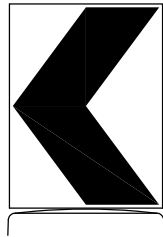


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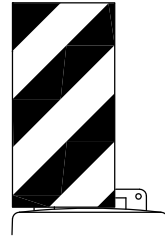
## SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

## BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES 5-19

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DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



18" x 24" Sign  
(Maximum Sign Dimension)  
Chevron CW1-8, Opposing Traffic Lane  
Divider, Driveway sign D70a, Keep Right  
R4 series or other signs as approved  
by Engineer



12" x 24"  
Vertical Panel  
mount with diagonals  
sloping down towards  
travel way

Plywood, Aluminum or Metal sign  
substrates shall NOT be used on  
plastic drums

#### SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

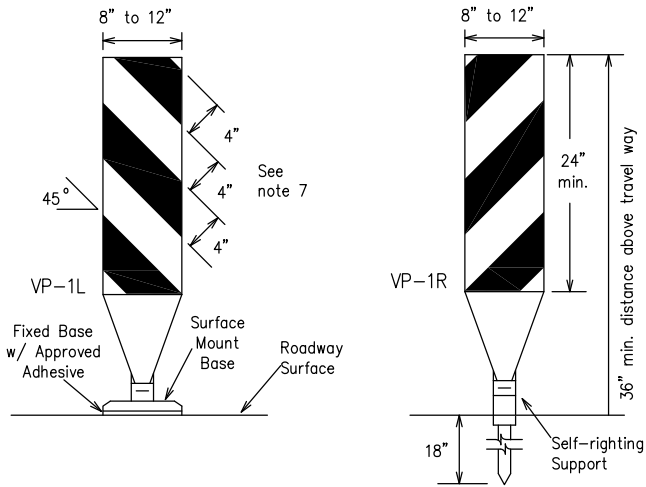


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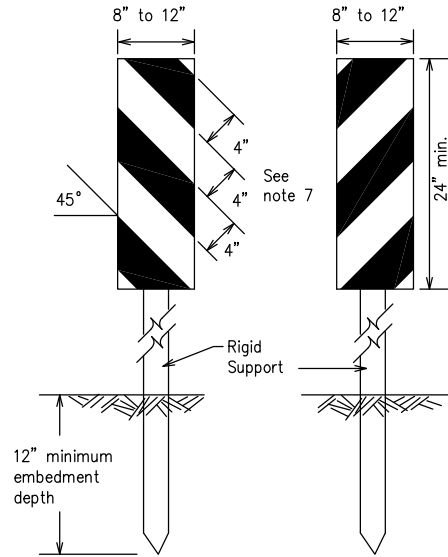
#### SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
CHANNELIZING DEVICES**  
5-20

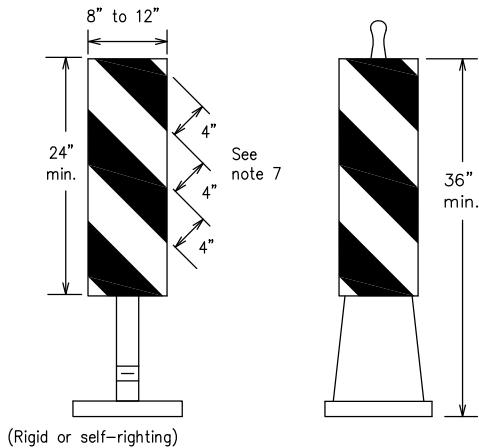
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DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



FIXED  
(Rigid or self-righting)



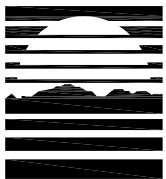
DRIVEABLE



PORTABLE

## VERTICAL PANELS (VPs)

1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

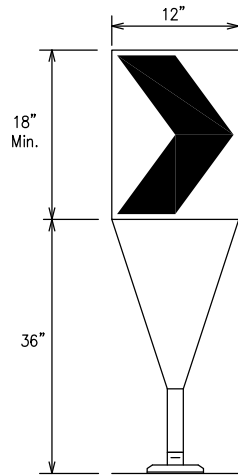


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## SECTION 5 **DESIGN STANDARDS FOR CONSTRUCTION**

## **BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES** 5-21

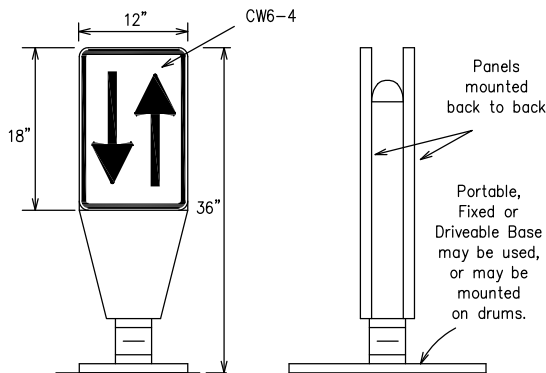
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DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



Fixed Base w/ Approved Adhesive  
(Driveable Base, or Flexible  
Support can be used)

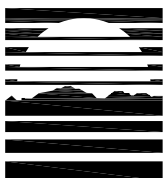
1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

## CHEVRONS



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

## OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

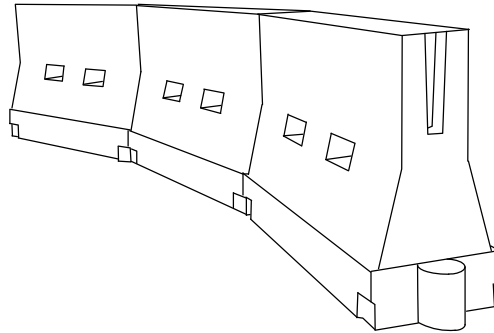


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## SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

## BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES 5-22

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#### LONGITUDINAL CHANNELIZING DEVICES (LCD)

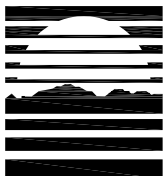
1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed near the top of the LCD along the full length of the device.

#### WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

#### HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS



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### SECTION 5 **DESIGN STANDARDS FOR CONSTRUCTION**

**BARRICADE AND CONSTRUCTION  
CHANNELIZING DEVICES**  
**5-23**

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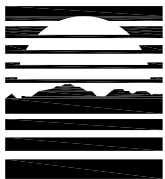
# GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

\*\* Taper lengths have been rounded off.  
 L=Length of Taper (FT.) W=Width of Offset (FT.)  
 S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF  
 CHANNELIZING DEVICES AND  
 MINIMUM DESIRABLE TAPER LENGTHS



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## SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

**BARRICADE AND CONSTRUCTION  
 CHANNELIZING DEVICES**  
 5-24

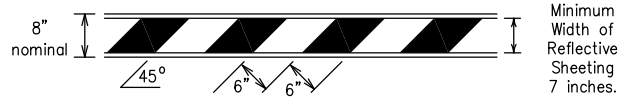
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 DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF



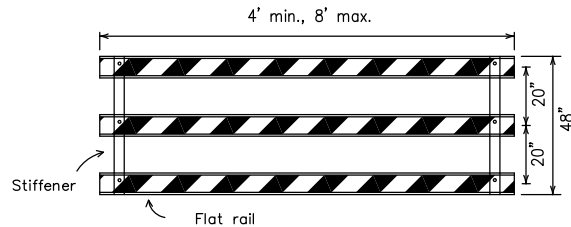
### TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. ~~Sheeting for barricades shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300 unless otherwise noted.~~

Barricades shall NOT  
be used as a sign support.

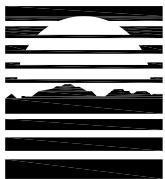


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL  
FOR SKID OR POST TYPE BARRICADES



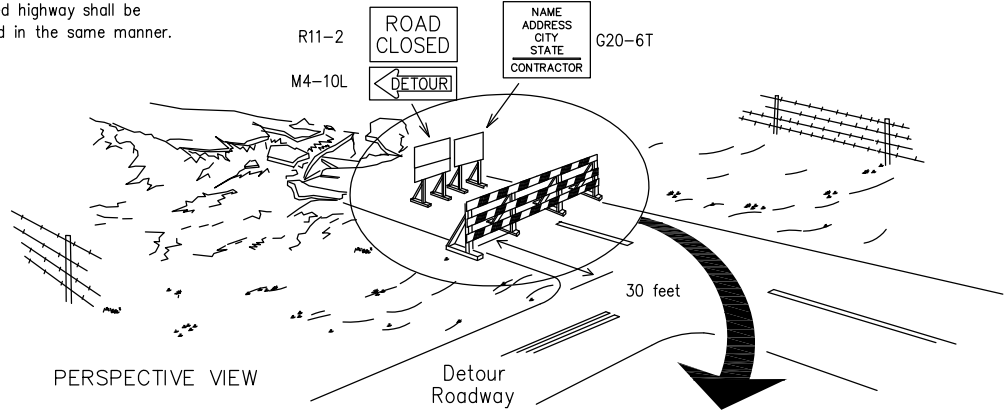
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## SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

### BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES 5-25

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Each roadway of a divided highway shall be barricaded in the same manner.

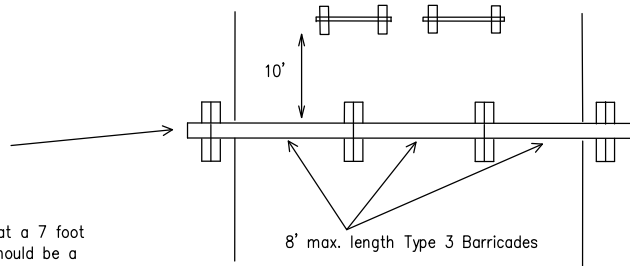


PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

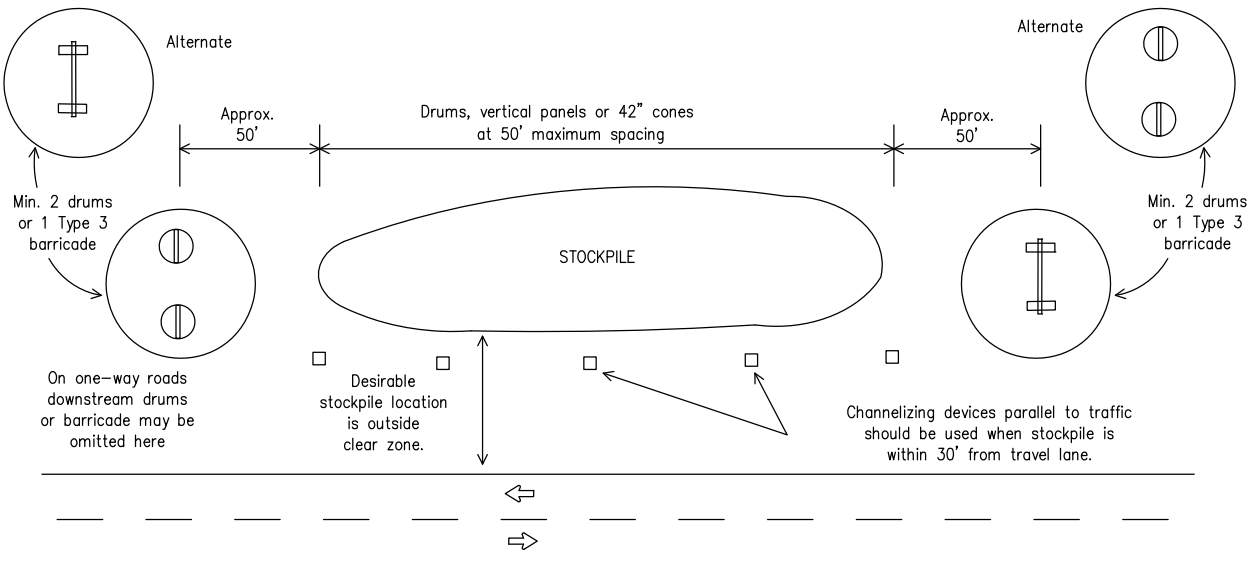
Barricade striping should slant downward in the direction of detour.

1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

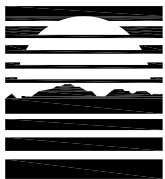


PLAN VIEW

### TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



### TRAFFIC CONTROL FOR MATERIAL STOCKPILES

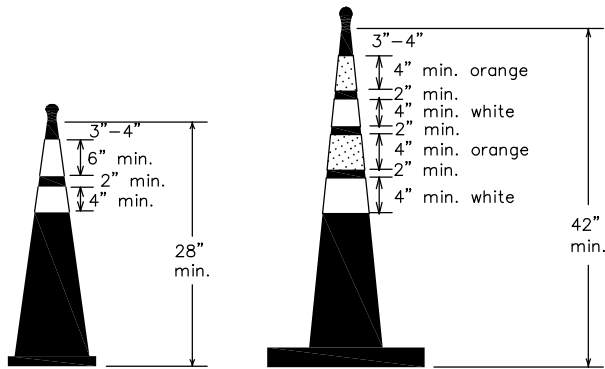


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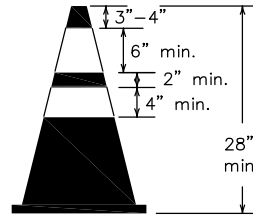
### BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES 5-26

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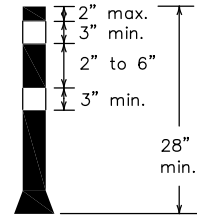


Two-Piece cones

## CONES



One-Piece cones



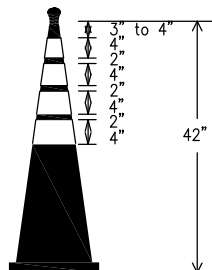
Tubular Marker

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.

28" Cones shall have a minimum weight of 9 1/2 lbs.

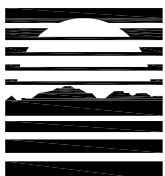
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

THIS DEVICE SHALL NOT BE USED ON  
PROJECTS LET AFTER MARCH 2014.



EDGE LINE  
CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

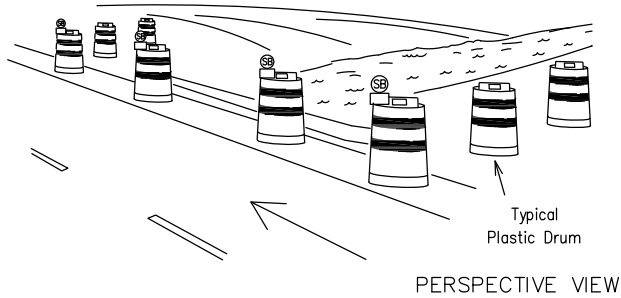


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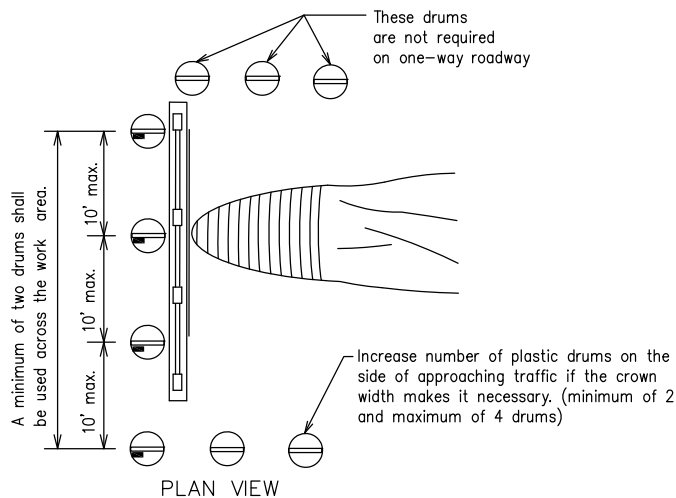
## SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION

## BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES 5-27

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF

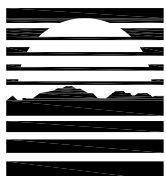


1. Where positive redirection capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
	Steady burn warning light or yellow warning reflector

# CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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## **SECTION 5 DESIGN STANDARDS FOR CONSTRUCTION**

## **BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES 5-28**

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
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## GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

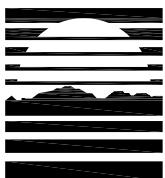
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

\* Conventional Roads Only

\*\* Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.

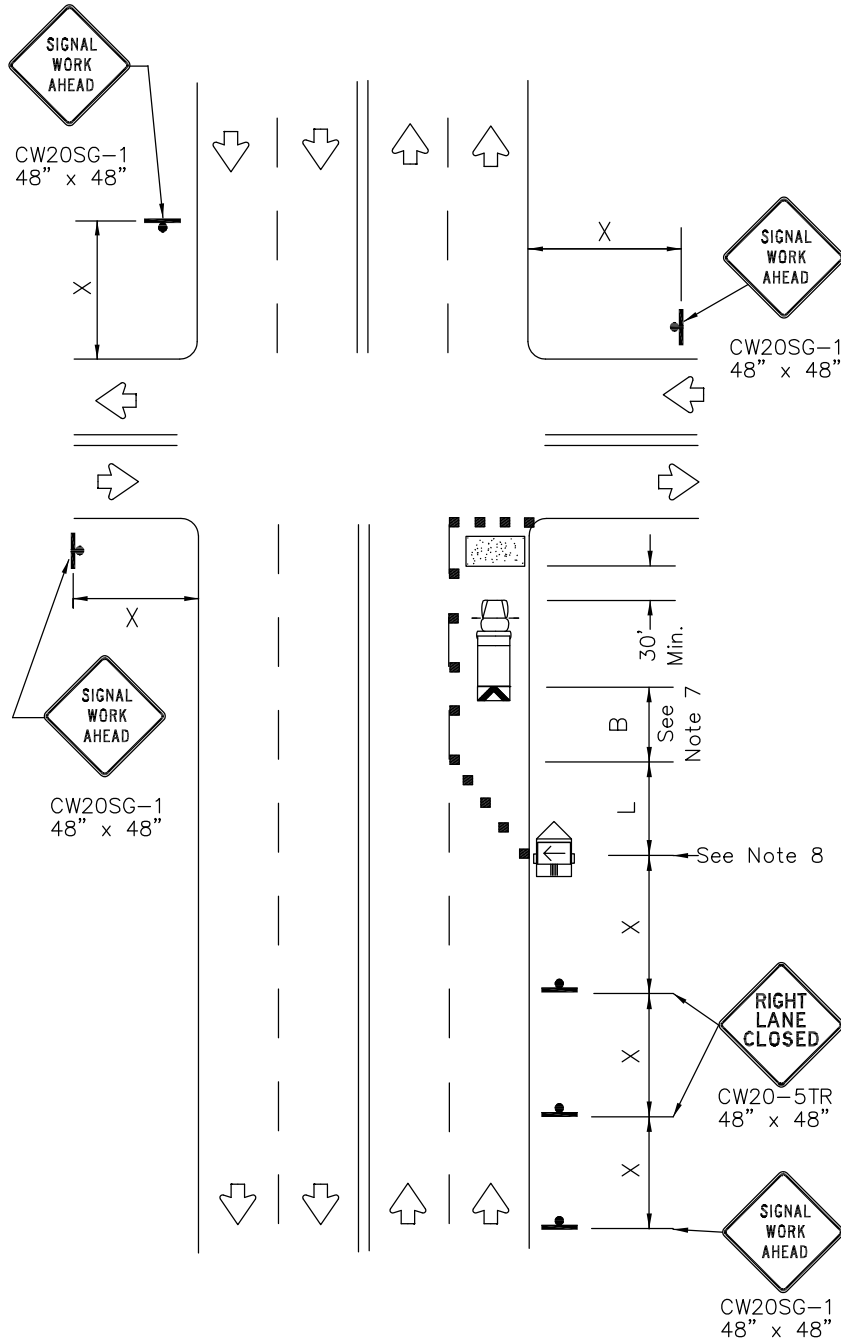


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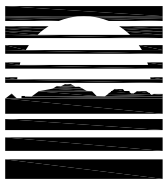
## SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

TRAFFIC SIGNAL WORK  
TYPICAL DETAILS  
5-29

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NEAR SIDE LANE CLOSURE  
SHORT DURATION OR SHORT TERM STATIONARY

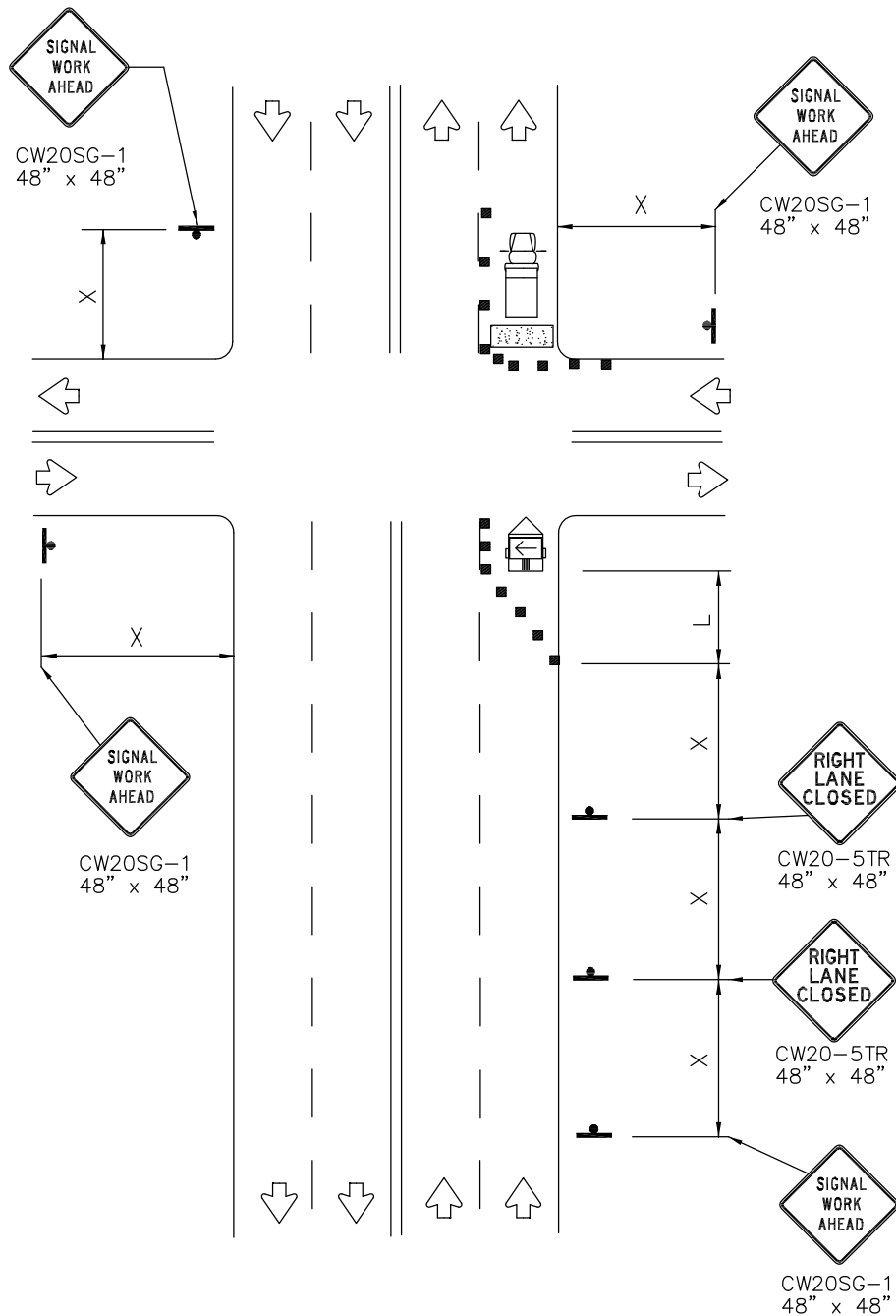


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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

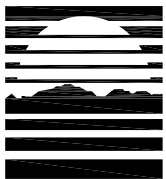
**TRAFFIC SIGNAL WORK  
TYPICAL DETAILS  
5-30**

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## FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

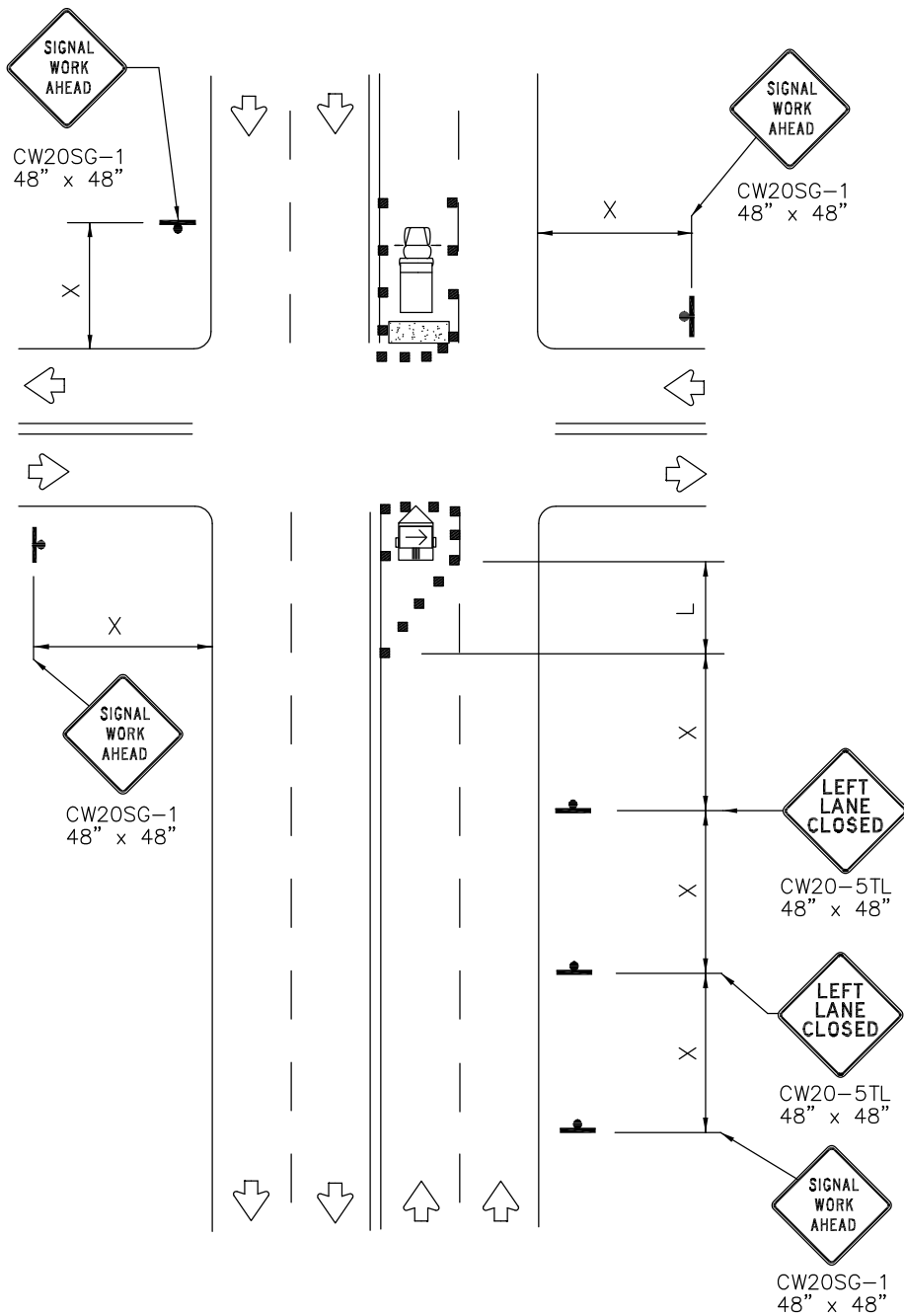


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### SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

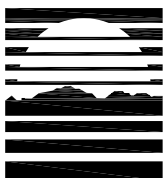
TRAFFIC SIGNAL WORK  
TYPICAL DETAILS  
5-31

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## FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



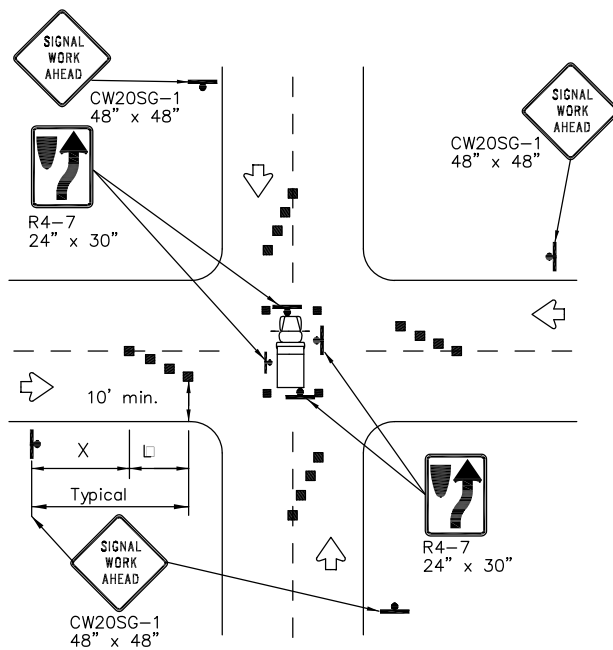
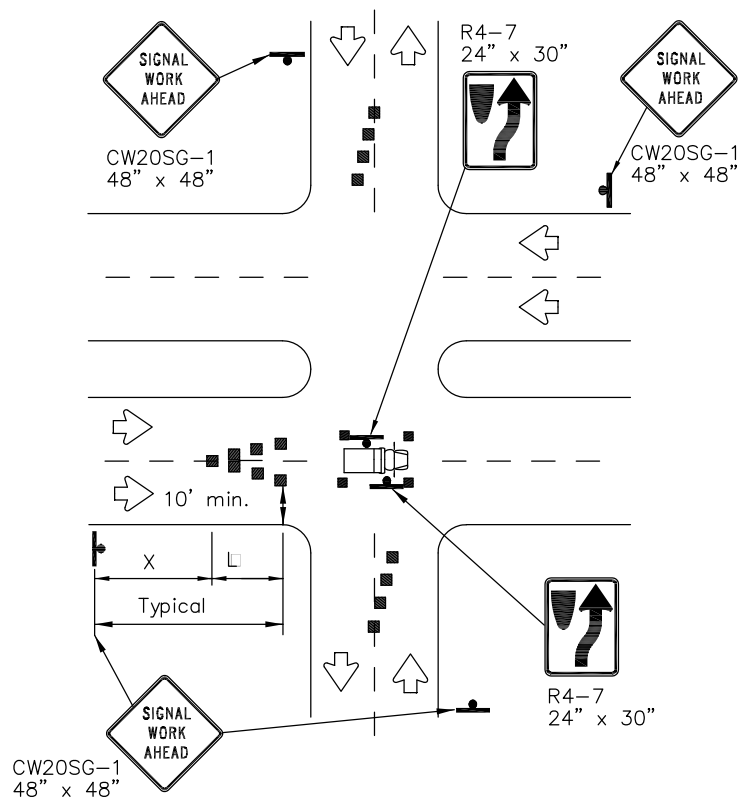
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### SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

TRAFFIC SIGNAL WORK  
TYPICAL DETAILS  
5-32

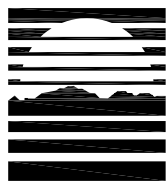
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OPERATIONS IN THE INTERSECTION  
SHORT DURATION

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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**TRAFFIC SIGNAL WORK  
TYPICAL DETAILS  
5-33**

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## GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

## DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

## SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

## REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.




## REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

## SIGN SUPPORT WEIGHTS

1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as tire inner tubes, shall not be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

## LEGEND

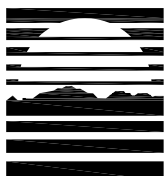
	Sign
	Channelizing Devices
	Type 3 Barricade

## DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B <sub>FL</sub> OR TYPE C <sub>FL</sub> SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:  
[http://www.txdot.gov/txdot\\_library/publications/construction.htm](http://www.txdot.gov/txdot_library/publications/construction.htm)

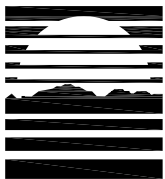


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## SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

## TRAFFIC SIGNAL WORK TYPICAL DETAILS 5-34

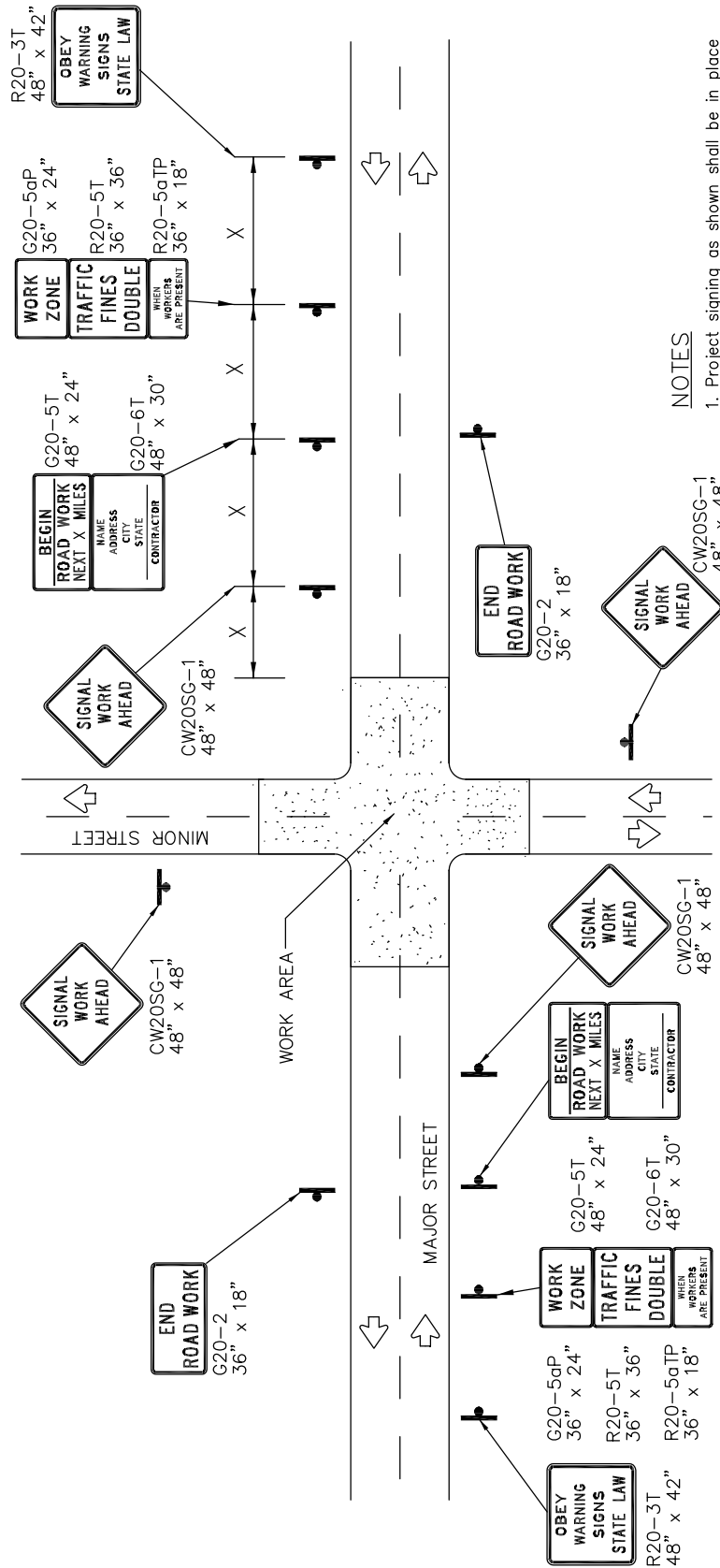
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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**TRAFFIC SIGNAL WORK  
BARRICADES AND SIGNS  
5-35**

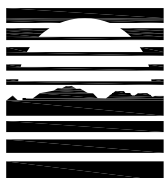
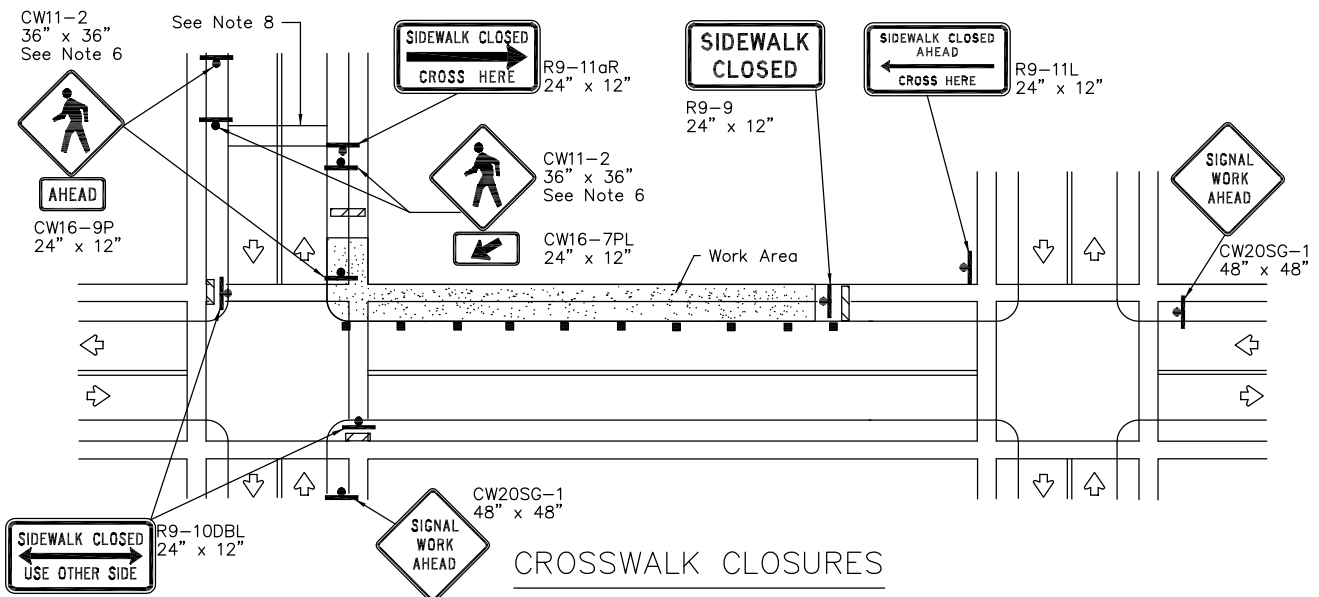
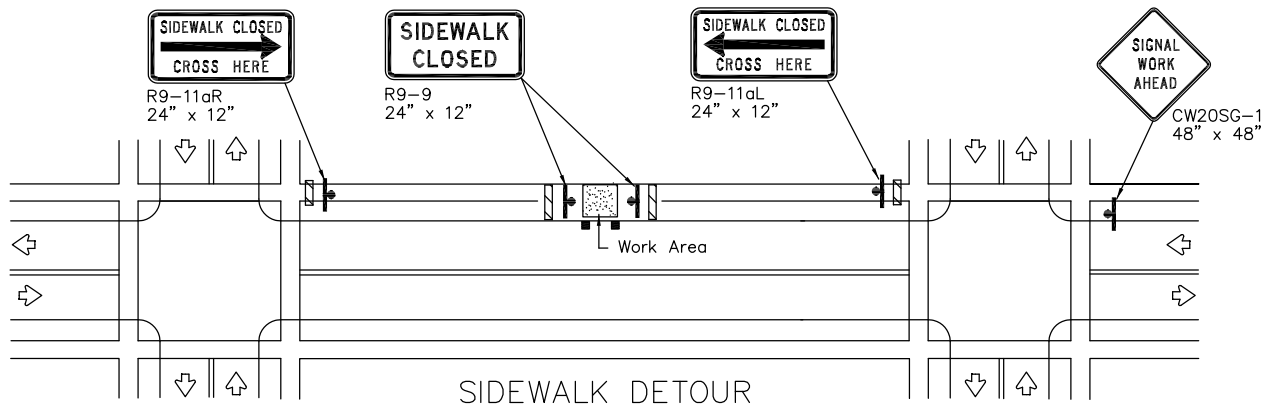
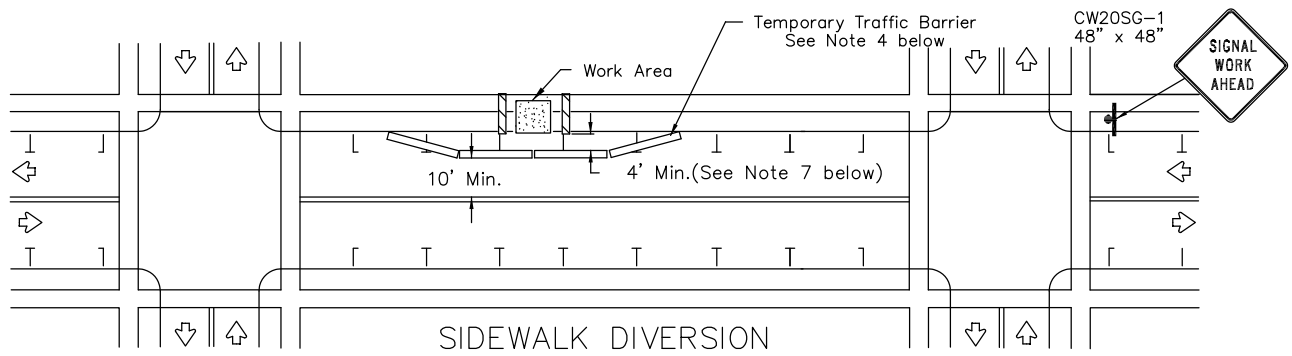


**NOTES**

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

**TYPICAL ADVANCE SIGNAL PROJECT SIGNING**

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS



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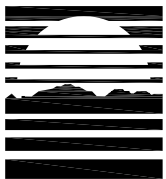
**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**TRAFFIC SIGNAL WORK  
BARRICADES AND SIGNS  
5-36**

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#### PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

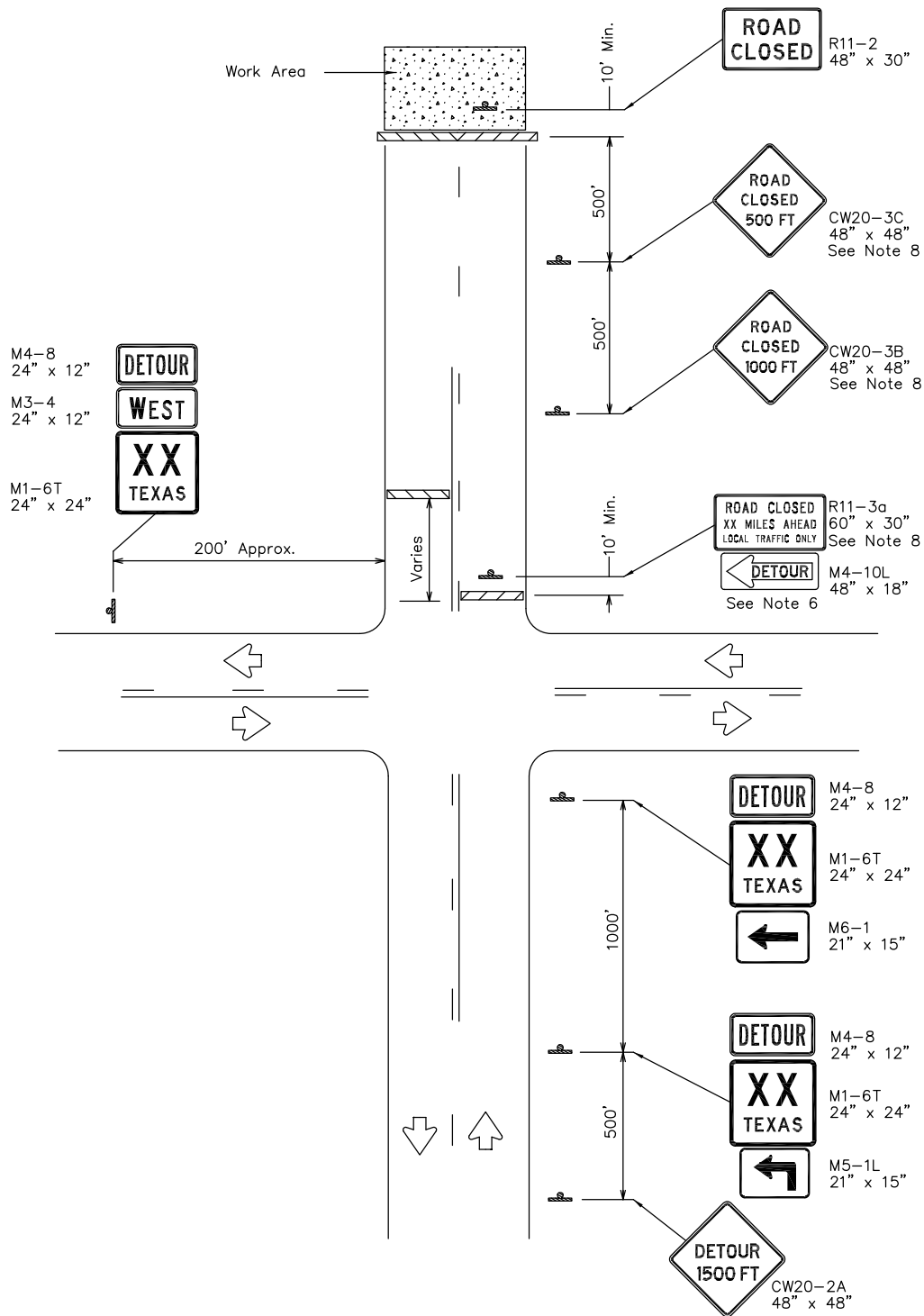


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#### SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

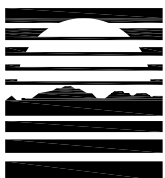
**TRAFFIC SIGNAL WORK  
BARRICADES AND SIGNS**  
**5-37**

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## ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour

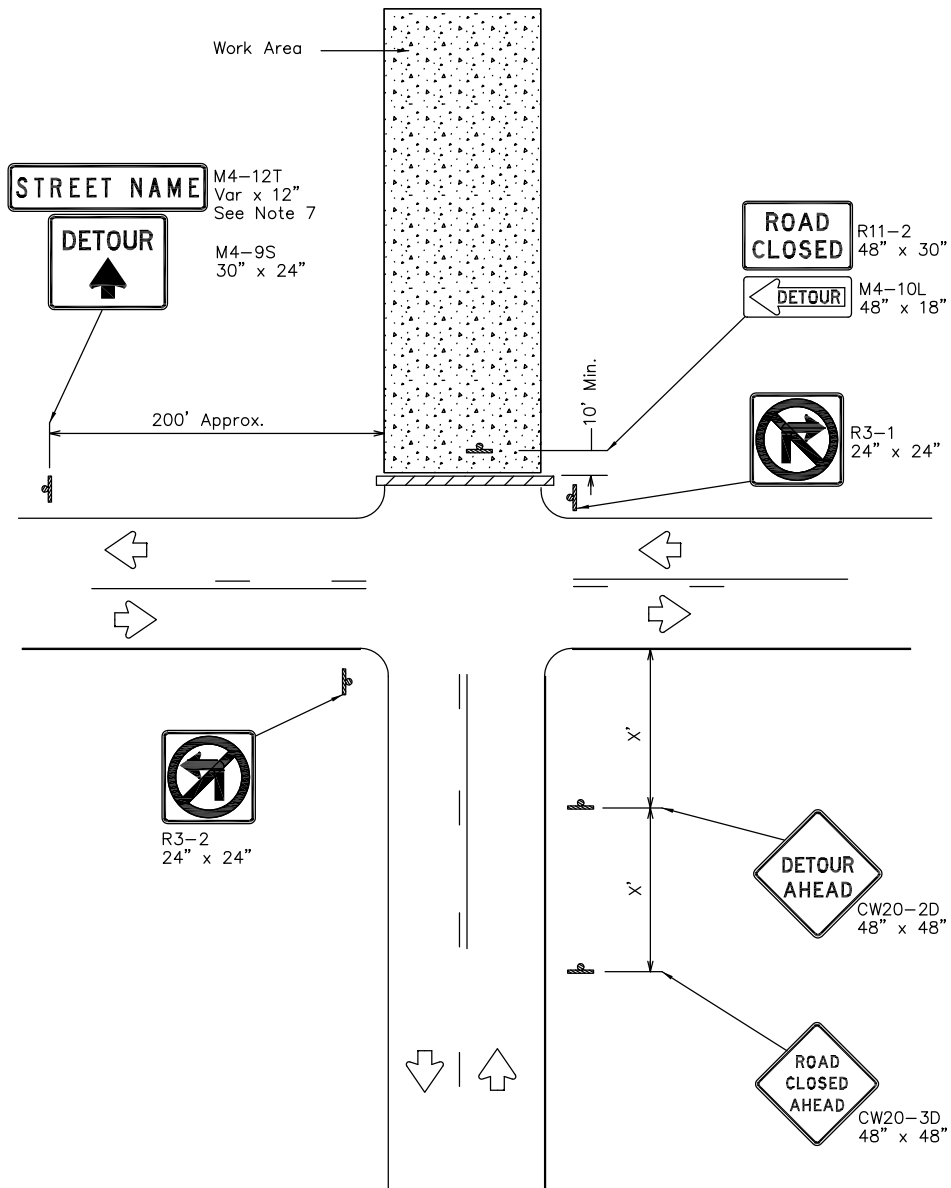


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### SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

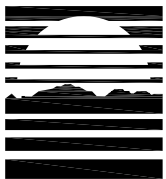
WORK ZONE ROAD  
CLOSURE DETAILS  
5-38

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## ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour



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### SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

**WORK ZONE ROAD  
CLOSURE DETAILS**  
5-39

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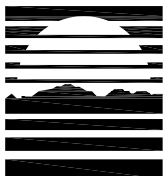
LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

\* Conventional Roads Only

### GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.



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### SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION






### WORK ZONE ROAD CLOSURE DETAILS 5-40

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## NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.
2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.
3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

LEGEND	
	Type 3 Barricade
	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

<http://www.txdot.gov/business/resources/producer-list.html>

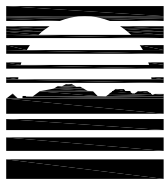


**TOWN OF  
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## SECTION 4 DESIGN STANDARDS FOR CONSTRUCTION

TRAFFIC CONTROL PLAN  
TYPICAL DETAILS  
5-41

APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
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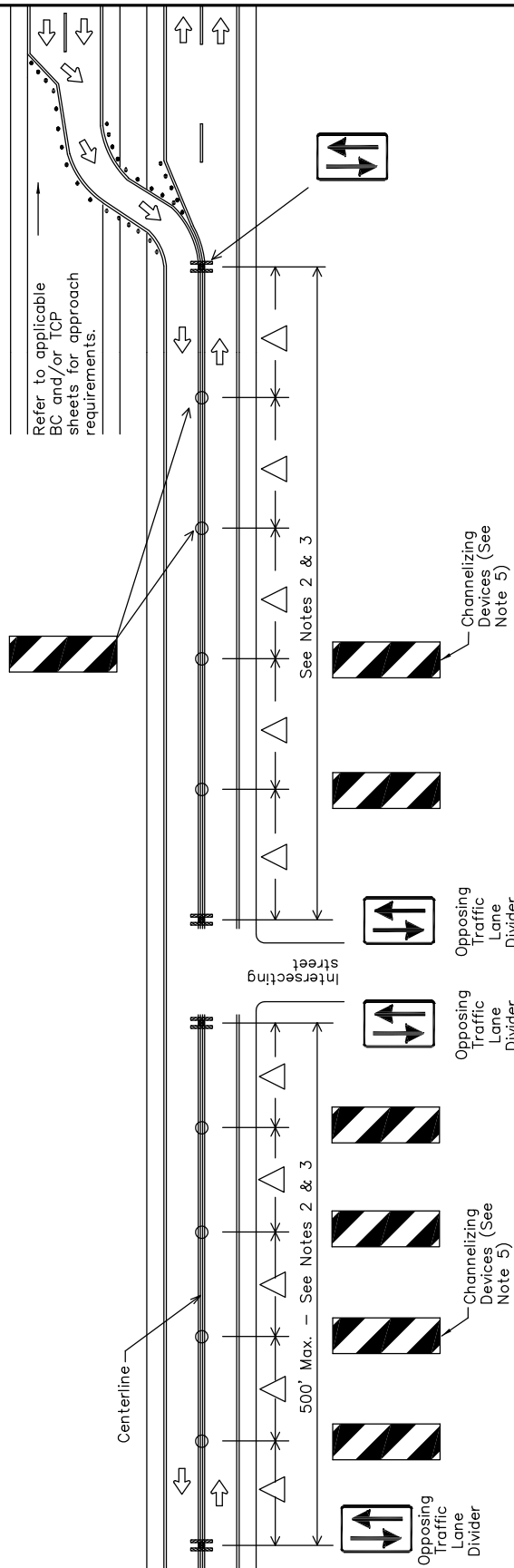


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**SECTION 4  
DESIGN STANDARDS  
FOR CONSTRUCTION**

**TRAFFIC CONTROL PLAN  
TYPICAL DETAILS  
5-42**

**VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD)  
SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS**



APPROVED BY: R. MEDINA CHECKED BY: R. MEDINA  
DATE: SEPT. 25, 2017 DRAWN BY: HZI STAFF