CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS
FOR
WIND & WATER SPORTS VENUE
FOR

PREPARED BY:

HDR Engineering, Inc.
555 N. Carancahua, Suite 1600
Corpus Christi, Texas 78401

ADDENDUM 1

MARCH 6, 2026

TBPELS FIRM REGISTRATION NO. 754

TABLE OF CONTENTS

CONTRACTOR'S PROPOSAL

Provide all necessary labor, materials, and supplies for the Marisol Boat Ramp Construction. Please use the Proposal/Bid Form on the next pages.

BID SUMMARY

BASE BID (ITEMS A1-A30) $_____

BASE BID RESTROOM (ITEMS B1-B9) $_____

ADDITIVE 1 PARKING LOT B (ITEMS C1-C10) $_____

ADDITIVE 2 PARKING LOT C (ITEMS D1-D10) $_____

TOTAL number of calendar days to substantial completion _____

ADDENDUM ACKNOWLEDGED _____ DATE _____

ADDENDUM ACKNOWLEDGED _____ DATE _____

ADDENDUM ACKNOWLEDGED _____ DATE _____

Enclosed with the proposal is a cashier's check or bid bond in the amount of $_____ (at least 5% of the base bid shown in the proposal).

COMPANY: _____

PHONE: _____

ADDRESS: _____

BY: _____ _____
Signature *Date*

_____ _____
Printed Name *Title*

A20	FURNISH & INSTALL ENTRANCE SIGN ASSEMBLY	EA	1	$	$
A21	FURNISH & INSTALL ENTRANCE SIGN ASSEMBLY	EA	1	$	$
A22	FURNISH & INSTALL STOP SIGN ASSEMBLY	EA	2	$	$
A23	FURNISH & INSTALL SPEED LIMIT SIGN ASSEMBLY	EA	2	$	$
A24	SITE CUT	CY	367	$	$
A25	SITE FILL	CY	7,475	$	$
A26	FURNISH & INSTALL EARTHGUARD FIBER MATRIX	AC	1.35	$	$
A27	FURNISH AND INSTALL BOLLARD FENCE (4 IN X 4 IN X 6 FT)	LF	7,821	$	$
A28	FURNISH AND INSTALL 6 IN THICK REINFORCED CONCRETE ENTRANCE DRIVEWAY (BY OTHERS)	SY	483	$	$
A29	FURNISH AND INSTALL REFL PAV MRK TY 1 (W) 24" (SLD)	LF	22	$	$
A30	BASE BID CONTINGENCY	LS	1	$100,000	$100,000

BASE BID (RESTROOM) SUMMARY OF IMPROVEMENTS					
ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QTY.	BID UNIT PRICE	BID PRICE
B1	FURNISH AND INSTALL PERMEABLE PLASTIC PAVERS	SF	1,594	$	$
B2	FURNISH & INSTALL WOVEN GEOTEXTILE	SY	178	$	$
B3	FURNISH & INSTALL COMPACTED NO. 57 STONE AGGREGATE	CY	48	$	$
B4	FURNISH & INSTALL 8" COMPACTED SAND SUBGRADE	CY	40	$	$
B5	SITE CUT	CY	1	$	$
B6	SITE FILL	CY	363	$	$
B7	FURNISH & INSTALL FOUNDATION	EA	1	$	$
B8	FURNISH & INSTALL RESTROOM FACILTIY (BY OTHERS)	EA	1	$	$

SECTION 28 10 01
ACCESS CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for a complete and fully functional access control system, to allow access to authorized personnel within pre-determined areas of the site, based on time and/or authority level.
2. Specifications require that access control reader interface devices and field devices to be interfaced with other security systems outlined in the Division 28 Sections.
3. Section 28 05 01 - Common Work Results for Electronic Safety and Security provides requirements that apply to the work of this section.

B. Related Sections but not necessarily limited to:

1. Section 03 30 00 - Cast-In-Place Concrete.
2. Section 07 48 13 - Through-Penetration Firestop Systems.
3. Section 08 11 19 - Stainless Steel Doors and Frames.
4. Section 08 33 23 - Steel Rolling Overhead Doors.
5. Section 08 70 00 - Finish Hardware.
6. Section 09 91 00 - Painting.
7. Section 14 24 00 - Hydraulic Elevators.
8. Section 27 05 26 - Grounding and Bonding.
9. Section 27 05 28 - Pathways for Communications Systems.
10. Section 27 05 36 - Cable Trays for Communications Systems.
11. Section 27 05 43 - Communications – Exterior Underground.
12. Section 28 05 01 – Common Work Results for Electronic Security Systems
13. Section 28 20 01 - Video Surveillance System
14. Section 32 31 13 - Chain-Link Fences and Gates.

1.2 REFERENCES

A. Reference Standards: Standards referenced in this section include, but are not necessarily limited to the following:

1. American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA).
   a. ANSI/TIA--569-E – Telecommunications Pathways and Spaces.
2. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
3. UL Solutions. (UL).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Coordinate installation of readers and integrate into special assemblies for narrow jamb frames and pedestal mounts.
2. Elevator Readers.
   a. Coordinate the required types, sizes, and quantities of conductors for the traveling cable with elevator contractor.

b. Coordinate card reader interface from elevator cab to elevator equipment room demarcation interface.
c. Coordinate interfacing elevator equipment to card access equipment with elevator contractor.
d. Coordinate installation of readers and integrate into elevator call panels/cab.
e. Coordinate with the Owner and Vertical Transportation Contractor the output time duration requirements to activate call and floor buttons.
f. Security features shall not affect emergency firefighter's services.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturers:
   a. See Section 28 05 01 for additional requirements.
2. Installers:
   a. See Section 28 05 01 for additional requirements.

1.5 SYSTEM ARCHITECTURE AND DESCRIPTION

A. Provide a microprocessor-based networked security access control and alarm monitoring system. System components shall have as a minimum, Access Control System Servers and Workstations, required software and licenses, field devices, remote I/O modules, readers, printer and all the required hardware and software for a complete and operational system.

B. System.

1. The alarm monitoring client workstation shall communicate with, and monitor, access control hardware devices, such as access control readers and access control panels. Administrative tasks including defining credential holder information, access groups, time zones, intrusion detection devices, configuring digital video cameras and recording devices, generating reports, creating maps, floor plans, site plans etc. shall be provided from any licensed client workstation on the network.
2. All system data shall reside on a single database on the server and be accessible in real time to all licensed system workstations connected to the network, to allow for automatic change propagation to all client workstations on the system, as well as to provide a common database to consolidate all information.

C. Access Control:

1. The system shall be programmed to provide access granted or denied decisions, define access levels, and set time zones and holidays. An input/output linkage feature shall allow linking of monitor zone points to output control points within Access control panels.

D. Alarm Monitoring:

1. Alarms are to be prioritized. The main alarm window shall provide information to include the time and location of the alarm, along with its priority. The main alarm window shall be able to sort pending and/or insert new alarms based on any of the following attributes: priority, date/time, alarm description, Access control panel, Card Reader, Input Module or cardholder.

E. Network Video Management:

1. The system shall include a seamlessly integrated network-based video management module, to allow for the central administration, monitoring, and archiving of network based video and the associated cameras. The system shall support network based video servers from multiple manufacturers.

F. Third Party Interfaces:

1. The system shall integrate with a number of third-party hardware and software products. The system shall provide seamless integration with fire alarm systems, personal safety

systems, video intercom systems, emergency assistance stations, elevator control interface and video systems.

G. System Administration:

1. System Administrative tasks such as defining client workstation & System Operator permissions set-up, access groups, time zones, reports, maps, etc. shall be provided from any client workstation on the network. Initial setup of the cardholder screen layout shall occur on the database server. The system shall support an unlimited number of access control readers, input points, video cameras, intrusion detection points, and relay outputs.

H. Application Programming Interfaces:

1. The system shall provide a set of standard Application Programming Interfaces (API's) and supporting documentation that allows hardware manufacturers and software application developers to integrate their products into the system. The Application Programming Interfaces shall allow requests from the end user to integrate a third party hardware or software solution based on system open architecture and system device independence.

I. Upgrades:

1. All systems shall be upward compatible. Access control hardware shall be compatible with all systems. Access control hardware (Access control panels, Input Control Modules, Access Control Readers, etc.) shall not require replacement or upgrades as the Owner migrates from the existing system level to a newer version.

1.6 APPLICATION DESIGN

A. Open Architecture:

1. The system shall have an open architecture design to support industry standards for databases, networks, credential printers, and video cameras.

B. Open Database Connectivity Compliance:

1. The system shall be Open Database Connectivity (ODBC) compliant. The system shall support a relational database management system with the proper 32-bit ODBC drivers.

C. Network Support:

1. The system shall be designed to support industry standard network protocols TCP/IP. The system shall also support peer-to-peer and FTP server capabilities.

1.7 DESIGN REQUIREMENTS

A. System shall consist of a server, one or more networked client workstations and access control and alarm monitoring processors, interfaced to the Owner’s building network.

1. System Software: 64-bit, latest version Windows operating system and application software. Software shall have the following capabilities:
   a. Graphical user interface to show pull-down menus and a menu tree format that complies with interface guidelines of Microsoft Windows operating system.
   b. System license shall be for the entire system and shall include capability for future additions that are within the indicated system size limits specified in this Section.
   c. System shall have open architecture that allows importing and exporting of data and interfacing with other systems that are compatible with Microsoft Windows operating system.
   d. Password-protected operator login and access.

B. Distributed Processing: System shall be a fully distributed processing system so that information, including time, date, valid codes, access levels, and similar data, is downloaded to access control processors to allow each access control processor to make access-control decisions for its location. Intermediate access control processors used to store access control information is not acceptable. In the event that communications to the server is lost, all access

control and alarm monitoring processors shall automatically buffer event transactions until communications are restored, at which time buffered events shall be uploaded to the Server.

C. Server/workstations shall provide operator interface, interaction, display, control, and dynamic and real-time monitoring. Server shall control system networks to interconnect all system components, including workstations and field-installed access control and alarm monitoring processors.

D. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of control panels, readers, sensors, etc.

E. Coordinate color of devices and readers with Architect to blend with surrounding environment prior to procuring. If color options of device are not acceptable to Architect, furnish the devices that have a paintable surface and coordinate with the painting contractor the requirements to paint the devices prior to installation.

F. Systems that require annual license renewal shall not be acceptable.

G. Communication.

1. Network connecting the Server and workstations shall be by the Owner.
2. Field equipment shall include access control/alarm monitoring processors, sensors, and controls. Access control/alarm monitoring processors shall serve as an interface between the Server and sensors and controls. Data exchange between the Server and the access control/alarm monitoring processors shall include down-line transmission of commands, software, and databases to access control/alarm monitoring processors. The up-line data exchange from the access control/alarm monitoring processor to the Server shall include status data such as intrusion alarms, status reports, and entry-control records. Access control/alarm monitoring processors are classified as alarm-annunciation or entry-control type.

H. Access Control/Alarm Monitoring Processors.

1. Access control field devices shall have an onboard UPS to allow for independent operation during power loss periods.
    a. Provide battery back up to all access control/alarm monitoring processors and power supplies, where Division 26 UPS power is not available. Refer to the Division 26 plans and specifications for UPS power circuit schedules and locations.
2. Equipment enclosures in the field shall be key-lockable, and equipped with tamper switches, to annunciate at monitoring workstations.
3. Locate access control panels adjacent to power supplies and door hardware power supplies in dedicated equipment rooms or communications rooms. Locating the panels at the door location is unacceptable.

I. The system shall comply with Underwriters Laboratories (UL) standards and shall carry the UL labels for UL 294 Access Control System Units.

1. The access control system shall operate within the limits of Class 2 remote-control and signal circuits as defined by Article 725 of the National Electrical Code, NFPA 70.

J. Integration with other trades.

1. Interface Readers into Elevator Lobby Call Stations to provide elevator call authorization upon presentation of a valid credential.
2. Integrate Readers into Precast and Construction Walls, Door Frames, etc.
3. Door Hardware Interface: Coordinate with Division 08 Sections that specify door hardware required to be monitored or controlled by the security access system. The access control/alarm monitoring processors in this Section shall have electrical characteristics that match the signal and power requirements of door hardware. Integrate door hardware specified in Division 08 Sections to function with the hardware in this Section.
    a. Provide interface to integral Request to Exit (REX) switch in the door hardware.
    b. In Line Power/Continuous Duty Protection Devices.

1) Provide protection devices with built-in surge protection and voltage regulation at each electric hardware device to protect the relays and sensitive electronics of the system from the electrical spike that occurs when electric hardware locks or unlocks. The equipment shall also provide protection to door which are programmed for continuous duty operation, reducing the output voltage by 25 percent to extend the life of the electric locks. Design Basis: HES model 2005 - SMART PAC II or approved equal.

4. Fire Alarm Interface. Provide interface from the fire alarm release directly to the hardware or hardware interface to release delayed egress equipment and locked doors in the path of egress in compliance with UL and Life Safety requirements. The fire alarm release shall not interface through security equipment.

K. PIN Codes:

1. PIN readers shall be provided at areas indicated on drawings. Accessing a door shall require entering a valid PIN in conjunction with presenting a valid card. A separate duress code shall be available to each credential holder to notify the operator at the security monitoring screen, as well as initiate an automatic alarm sequence when the duress code is entered.

L. Request to Exit Motion Detectors (where indicated on drawings)

1. Adjust request to exit motion detector timers to 1-2 seconds. The access control systems shall govern the duration time of door unlocks and door held opens.
2. Request to exit motion detectors shall be programmed to shunt door position switches only, unless life safety codes require the affected door to be unlocked.

M. Cable Requirements.

1. Sensor and card reader cable shall be a minimum 22 AWG
2. Lock cable shall be a minimum 18 AWG, however, shall be sized larger base on distance and current rating.

1.8 PERFORMANCE REQUIREMENTS

A. System Response to Alarms: Field device network shall provide a system end-to-end response time of 1 second or less for every device connected to the system. Alarms shall be annunciated at the monitoring station within 1 second of the alarm occurring at an access control/alarm monitoring processor or device controlled by a local Access control panel, and within 100 ms if the alarm occurs at the Server. Alarm and status changes shall be displayed within 100 ms after receipt of data by the monitoring station. All graphics shall be displayed, including graphics-generated map displays, on the console monitor within 5 seconds of alarm receipt at the security console. The response times shall be maintained during system heavy load.

B. Acknowledgeable Events: Any user programmed alarm event shall cause the card access system workstation to provide an audible and visual alarm requiring the operator to acknowledge the event and enter via the keyboard a report of the event and cause.

C. Handicap Entrances:

1. Interface to electric locks and automatic door opening equipment at handicapped access locations. Presentation of a valid card shall unlock the door, and enable the door open button. The credential holder shall then have the option to press the door open button, or manually open the door. The card access system shall not disable the egress door-open button.

D. Elevator Readers:

1. Provide readers adjacent to elevator call button locations as indicated. The call buttons at reader locations shall be disabled under normal conditions. Presenting a valid card shall enable the elevator call buttons, allowing the credential holder to select the direction of intended travel.
2. Provide readers in elevator cars locations indicated. The system shall restrict the credential holder’s access to areas on a per-floor basis. The floor selection buttons within the elevator

car shall be disabled under normal conditions. The presentation of a valid card shall enable the floor buttons the credential holder is authorized to access. Floor restrictions per cardholder shall be modified through the programming in the access control system.

E. ADA Accommodation.

1. Cards designated for ADA access shall be programmed to an extended door unlock time to allow sufficient time for handicapped individuals to open the door.

1.9 SUBMITTALS

A. Action Submittals

1. Shop Drawings:
   a. Fabrication and/or layout drawings:
      1) Routing, size, and fittings.
      2) Seismic location installation details.
2. Product data.
   a. Provide submittal data for all products specified in PART 2 of this Section.
   b. See Section 28 05 01 for additional requirements.

B. Informational Submittals:

1. Cable tray fill calculations.
2. Cable schedule of number and type of cables in cable trays.
3. Project planning documents.

C. Closeout Submittals

1. Operation and Maintenance Data
   a. Contract closeout information:
      1) Refer to Section 01 78 23 - Operation and Maintenance Data.
      2) Provide schematic drawings depicting type and location of interface equipment/components, number of cables and conductors, types of connectors, circuit requirements and type and dimensions of enclosures.

D. Maintenance Material Submittals:

1. Furnish the following items and submit documentation of delivery to and acceptance of such items by Owner, in accordance with Section 01 78 43 - Spare Parts and Extra Materials:
   a. One card reader of each type used as a spare.
   b. One access control/alarm monitoring processor as a spare.
   c. One reader interface module for each type used as a spare.
   d. One power supply of each type used as a spare.
   e. [1500] access cards.
   f. Backup software and database programs upon completion of the programming of all access control information. Demonstrate to the Owner that the copies provided can be accessed by the Owner and that the entire database is contained on the disks. Demonstrate to the Owner the procedure for restoring the system using the backup disks.
   g. One factory box for each component, addressed to the manufacturer to facilitate factory return for repair authorizations.
   h. Written procedures for obtaining return authorizations. (If not required, state so in writing.)

1.10 PROJECT DELIVERY, STORAGE AND HANDLING

A. Refer to Section 28 05 01.

1.11 WARRANTY

A. Comply with the requirements of Section 28 05 01 - Warranty.

B. User Cards shall be warranted for a period of five years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with Contract requirements, furnish products of one of the following listed manufacturers.

B. Access Control Equipment:

1. Software House
2. Lenel
3. AMAG Technology
4. Hirsch
5. Or Equal.

C. Request to Exit Motion Equipment:

1. Interlogix - Model RCR-REX
2. Securitron - Model XMS
3. Visonic
4. Or Equal.

D. Card Reader:

1. HID Corp.
2. CISCO
3. IBM
4. Or Equal.

E. Motion Detection Equipment:

1. Interlogix
2. Detection Systems
3. Honeywell International
4. Or Equal.

F. Door Position Switches:

1. Magnasphere
2. GRI, Inc
3. Honeywell
4. Aleph International
5. Flair Electronics
6. Or Equal.

G. Power Supplies.

1. LifeSafety Power
2. Alarm Saf
3. Altronix.
4. Or Equal.

H. Enclosures:

1. Hoffman
2. Rittal Corporation
3. Hammond
4. Middle Atlantic Products
5. Stantron
6. Bud
7. Or Equal.

2.2 SYSTEM REQUIREMENTS

A. Workstation Software:

1. The access control software shall operate with the latest Windows Server and client workstation operating system.
2. Password levels shall be individually customized at each workstation to allow or disallow operator access to program functions for each location. Each user's access shall be partitioned to restrict access to only view and modify authorized files, database, remote servers, menus, screens, and individual fields within each screen.
3. The system shall provide two-way communication with third party database on the building network for other database sharing applications. The relational database shall ODBC compliant.

B. The access control database shall have the following minimum system capabilities.

1. Readers - [2000].
2. Cardholders - [400,000].
3. Alarm Points - [35,000].
4. Time schedules - [250].
5. Access Groups - [1500].
6. Relay outputs - [35,000].
7. Alarm priorities - [250].
8. Operator passwords - [2000].
9. Operator groups - [1000].
10. User definable cardholder fields - [120].

2.3 ACCESS CONTROL SYSTEM SOFTWARE REQUIREMENTS

A. General Requirements:

1. The system shall provide for password restricted operator access levels. This feature shall restrict access to sensitive programming functions to authorized personnel only. The highest-level password shall have access to all system databases and functions. Each password shall be individually programmable to restrict operator access to programming and operator functions, commands, database access, and alarm point and control point functions.
2. The system shall provide an audit feature to maintain an historical record of what changes were made and who made them.
3. Graphical Maps:
   a. The system shall provide for map graphics, floor plans, site plans that graphically depict system status. Icons placed on graphical backgrounds shall be used to indicate the real time status of each system connection including access control reader connections, alarm inputs, control point outputs, communication connections, etc.
   b. The icon of the device in alarm shall be differentiated from other device symbols by enhancement, color change and/or flashing. Different enhancements shall indicate normal, alarm, trouble, time schedule shunt, manual shunt and other status conditions provided by the system.

c. The system shall be capable of being configured to automatically call up a graphical map upon system-generated alarms without an operator request.
d. The system shall provide for the import of graphics generated by other drawing programs.

4. The system shall provide for a status screen on the security monitoring screen. The status screen shall be manually displayed by an operator any time during a session with a mouse click. The operator shall be able to select any group to view in more detail. The status screen shall display the following:
   a. A complete list of all alarm points displaying the status of each alarm point.
   b. A complete list of all doors displaying the status of each door.
   c. A complete list of all outputs displaying the status of each output.
   d. A complete list of all Alarm Zones displaying the status of each Alarm Zone.
5. The operator shall have the ability to display multiple alarms, queued in their order of priority.
6. The system monitoring screen and event printer shall display and record the alarm message in real time including: the time, date location, point description, event type and point status of each point transaction.
7. The operator shall be able to verify current status of any point in the system and change any of the programmable point descriptors via the Client Workstation.
8. All software applications shall be specifically designed for security and access control. A current high-level language shall have been used to develop all application programs.
9. The system shall include a schedule program that will allow the Owner to automatically schedule events such as report printing, output commands, door access, alarm access, etc. on a time/day programmable basis in advance.

B. Access Control:

1. The system shall provide control point outputs for lock power control activated by access control reader, client workstation keyboard or time schedule.
2. All alarm control points as well as access control reader inputs shall be capable of independent time schedule via software controls from the access control/security monitoring system.
3. The system shall provide for controlled access through reader controlled doors based on the user's access levels. An access level shall define a door or group of doors accessible by authorized individuals during a certain time period(s). Time periods shall include both authorized days and hours. The system shall provide for controlled access through reader controlled doors based on the user's authorization. Users shall be allowed to add or remove selected doors within an access level for individual credential holders. This shall also include the ability to assign multiple access levels to credential holders.
4. The system shall provide for automatic credential holder activation and expiration by specified time and date.
5. The system shall store in memory every access transaction, describing the nature of the transaction, time, date, reader location, credential holder name and validity status.
6. The system shall provide for alarm indication at the system monitoring station for unauthorized reader use attempts. Unauthorized reader use alarms shall be user selectable on a reader-by-reader basis. When configured in Card and PIN mode the system shall automatically invalidate the badge after five consecutive invalid PIN attempts. The system shall not allow duplicate PIN numbers.
7. The system shall provide screen display and event printing of transactions (all transactions or violations only; by user and by reader).
8. The system shall provide momentary or maintained release of reader controlled door locks via the monitoring screen.
9. The system shall provide for user programming of the following data for each card:
   a. Card number (internal and hot stamp).

b. Access Levels.
c. Authorized Areas.
d. Effective Date.
e. Expiration Date.
f. Credential holder Name.
g. Credential holder ID number.
h. Employee status (active, retired, temporary, etc.).
i. Credential holder department name.
j. Credential holder automotive license number.
k. Credential holder phone number.
l. Company name (if other than system owner).
m. User definable fields.

C. Database Queries, Editing and Printing:

1. The system shall provide for database queries, database editing and report printing via user definable parameters. The system shall be capable of printing requested queries and reports to the system monitoring screen or its associated report printer. In addition, the system shall be capable of conducting a file search by field or combination of user definable fields. Upon the users request, searched and sorted files shall be capable of being printed in the order dictated by the user, i.e. alphabetically by last name, numerically by badge number, alphabetically by department name, etc.
2. The system shall provide for report printing and/or display of any group of events within any selectable time period. The Report printer shall be capable of producing a hard copy of any report that the system may generate. Reports shall include historical events, defined by any combination of the following categories:
   a. All Events.
   b. Location.
   c. Point Number.
   d. Event Type (e.g. intrusion, door open, etc.)
   e. Point Status (e.g. on, off, alarm, normal, shunted, etc.)
   f. Management reports of transactions history by card number, cardholder data, reader number, time period, or invalid attempts.
   g. Audit trail reports.
3. The system shall allow the exporting of report outputs directly to another database.

2.4 SECURITY APPLICATION SERVER AND WORKSTATIONS

A. The Database Server for the Access Control & Alarm Monitoring Systems shall consist of the following minimum specifications:

1. 2 RU TIA/EIA Rack Mountable.
2. Operating System: Microsoft Windows, latest version.
3. Processor: Intel Xeon processor E5-2600v4 Series.
4. Chip Set: Intel C612 (or Latest)
5. Memory Specifications:
   a. Quad channel memory 1TB 2400 MHz DDR4 ECC memory.
   b. Dual CPU’s.
6. Graphics:
   a. 4 PCI Express x16 Gen 3 graphics cards - 675W
      1) Total 3 x 225W graphic cards in 3 slots.
7. Storage: 3.5 inches SATA (4) 4TB 5400 rpm drives.
8. Storage Controller:

a. Integrated: LSI SAS 3008 12Gb/s SAS (6Gb/s SATA) controller.
    1) RAID 0, 1, 10 capable of 8 drives.
    2) 2 integrated Intel controller (6Gb/s) SATA ports for optical drives.
9. Communications:
    a. Integrated: Intel I217 & I 210 Gigabit Ethernet controllers.
        1) Intel Remote Wake Up.
        2) PXE and Jumbo frames support.
10. Audio Controller: Integrated Realtek ALC3220 High Definition Audio Codec (2 Channel).
11. I/O Ports:
    a. 6 - USB 2.0
    b. 4 - USB 3.0
    c. 1 - Microphone.
    d. 1 - Headphone.
    e. 1- 2x5 USB 2.0 header.
    f. 8 - SAS @ 12Gb/s (supports SATA @ 6 Gb/s as well)
    g. 1 - Audio Line out.
    h. 1 - Audio Line in/Microphone.
    i. 1 - Serial port.
    j. 2 - RJ45 Network ports.
12. Bays.
    a. (1) External slimline optical bay.
    b. (4) Internal 3.5 inches bays (support total of (4) 3.5 inches or 2.5 inches drives)
    c. (1) External 5.25 inches bay.
13. Slots.
    a. (2) PCIe x16 Gen 3
    b. (1) PCIe x16 Gen 3 (wired as x4 - Slot 1)
    c. (1) PCIe x16 Gen2 (wired as x4)
    d. (1) PCI 32 Bit.
14. Power Supply:
    a. 1300W (input voltage 120VAC-240VAC)
    b. 90 percent efficient (80PLUS Gold Certified)
    c. Externally accessible and removable.
15. Storage devices: Slimline DVD-ROM; DVD+/-RW
16. USB Keyboard.
17. USB Optical 3 button Mouse with scroll wheel.
18. User Interface: Remote operation via the security management operator workstation.
19. Surge Suppression Strip.
20. Server Software:
    a. Microsoft Server Operating System, latest edition.
        1) Minimum of five (2) client licenses.

B. The client workstation for the latest Microsoft Windows operating systems shall consist of the following minimum specifications:
    1. 2 RU TIA/EIA Rack Mountable.
    2. Processor: Intel Core i7 (8 core, 16M cache, 2,9Ghz)
    3. Memory: 16GB DDR4 2666Mhz SoDIMM Non-ECC Memory.
    4. HD:

a. 512GB PCIe NVMeClass 40 M.2 SSD for operating system.
b. 1TB secondary Hard drive, RAID 1 500GB backup drive.

5. Five (5) USB 3.0 ports.
6. Anti-virus software.
7. PCIe 2.0 x 16 NVIDIA or ATI Video card 8 GB GDDR6 with 4 mDP to DP adapter outputs.
8. Optical mouse.
9. 48XCDRW and 16XDVD+RW/+R.
10. C9- All SCSI drives, RAID 1, 2 drive total configuration.
11. Two (2) 73GB Ultra 320 SCSI, 1 inch.
12. U320 SCSI Controller Card.
13. PERC RAID Controller.
14. Intel Pro 1000MT Copper Gigabit Network Adapter.
15. LAVA QUATTRO-PCI Bus 4-Port Serial Board.
16. Provide monitor trees to accommodate multiple monitors where indicated on drawings. Monitor trees shall accommodate standard VESA mounting.
17. 128MB PCIe x16 nVidia Quadro FX 1300.
18. Sound Blaster- Audigy™ 2 (D), w/Dolby Digital 5.1. Include software programming and hardware provisions to inhibit users from adjusting the volume and silencing/disabling the sounder after the initial volume setup.
19. Stereo speakers.
20. Standard Windows Keyboard.
21. Surge Suppression Strip.
22. Epson FX-870 Logging Dot Matrix Printer, or equivalent.
23. Hewlett Packard 1320n Report Laser Printer, or equivalent.
24. Software:
    a. Microsoft Windows - Latest Version.
    b. Microsoft SQL Server - Latest Version Client License.
    c. System Client Software - Latest Version.

2.5 MONITORS

A. Diagonal Viewing Size: 24 inches.

B. Aspect Ratio: 16:10

C. Panel Type, Surface: AH In-plane switching, anti glare with hard coat 3H

D. Optimal Resolution: 1920 x 1200 at 60 Hz.

E. Contrast Ratio: 1000 to 1 (typical), Dynamic Contrast Ratio: 2 Million:1 (Max)

F. Backlight Technology: LED

G. Brightness: 350 cd/m2 (typical), 50 cd/m2 (minimum)

H. Response Time: 6ms (grey to grey)

I. Max Viewing Angle: 178º vertical / 178º horizontal.

J. Color Support:

1. Color Depth: 1.074B colors.
2. Color Gamut (typical): Adobe RGB 99%, sRGB 100% and 120% (CIE 1976)

K. Pixel Pitch: 0.27 mm.

L. Display Type: Widescreen Flat Panel Display.

M. Connectivity - Minimum:

1. 1 Digital Visual Interface connectors (DVI-D) with HDCP
2. 1 DisplayPort 1.2 (DP)
3. 1 High Definition Multimedia Interface (HDMI)
4. 1 USB 3.0 upstream port.
5. 4 USB 3.0 downstream ports.
6. 1 DisplayPort out.
7. 1 Audio output Max Sync Rate: 76 Hz x 81 kHz.

N. Provide video monitor tree to support 4 monitors. Provide anchoring to the desk surface.

2.6 ACCESS CONTROL HARDWARE COMMUNICATIONS

A. The system shall have the ability to communicate with the access control/alarm monitoring processors by either RS485 or LAN/WAN connections utilizing TCP/IP communications protocol. The system shall also have the ability to communicate with the access control panels through remote dial up capabilities.

B. Downloading or database changes shall not interfere with any output control, access decisions, alarm monitoring, traces, or any other required function of the access control hardware and alarm monitoring client workstation. Communications between the system client workstation(s) and the access control/alarm monitoring processors shall be interleaving so that alarms will still report to their respective alarm monitoring client workstations while downloads are occurring.

C. Upon losing and then restoring communications between the access control/alarm monitoring processors and the system database, database synchronization between the system database and the local database in each access control/alarm monitoring processor shall be fast and efficient.

2.7 ACCESS CONTROL/ALARM MONITORING PROCESSORS

A. Access control/alarm monitoring processors shall operate as an autonomous intelligent processing unit. Access control/alarm monitoring processors shall make decisions about access control, alarm monitoring, linking functions, and door locking schedules for its operation, independent of other system components. Access control/alarm monitoring processors shall be part of a fully distributed processing control network. The portion of the database associated with access control/alarm monitoring processor and consisting of parameters, constraints, and the latest value or status of points connected to that access control/alarm monitoring processor, shall be maintained in the access control/alarm monitoring processor.

B. Description overview:

1. The access control/alarm monitoring processor shall communicate to the host computer in a single path configuration of Ethernet or RS485.
2. The access control processor shall support a minimum of twenty readers, easily populated through the use of the following.
    a. Distributed reader modules for support of:
        1) Biometric Gateways.
        2) Credential Readers.
    b. Input Control Modules.
        1) Input module shall provide 8 fully supervised inputs and 4 non supervised inputs.
    c. Output Control Modules.
        1) Each reader module shall have the additional capacity of 8 relay outputs.
3. The access control processor shall have the following characteristics:
    a. Shall store a minimum of [100,000] credential holders online.
    b. Incorporate Flash upgradeable firmware.
    c. Provide supervised alarm inputs to monitor the status of alarm circuits and report the status information to the monitoring screen.

d. Provide control relay outputs for controlling devices by remote command from the system, through time schedules or on alarm point activation.

e. Contain enough RAM to maintain a card database of [100,000]

f. Automatically disconnect from the communication loop upon a communication failure within the access control processor to prevent the communication to other access control processors in the loop from being interrupted.

g. Upon loss of communication, the access control/alarm monitoring processor shall contain enough memory to operate normally. In addition, the access control/alarm monitoring processor shall store a minimum of [10,000] prioritized transactions or events and shall automatically transmit that data to the system as soon as communication is restored.

h. Upon verification of credential authorization or request to exit, the processor shall activate a door control relay output and shunt the intrusion alarm. The lock control outputs shall be rated for a minimum of 1A @24 VDC. Relay activation time shall be adjustable from 0 to 49,999 seconds on an individual reader basis. The door shall automatically relock upon opening.

i. Provide an intrusion alarm indication on the system if the reader controlled door is opened without an authorized credential use or request to exit.

j. Shall provide a door prop alarm indication on the monitoring screen if the reader controlled door is held open past an adjustable time period after an authorized credential use or request to exit. The door prop alarm delay shall be adjustable from 0 to 99 seconds on an individual reader basis.

k. Acceptable manufacturer for the access control/alarm monitoring processor shall be the same manufacturer of the software to insure control of quality and integrated performance capabilities.

C. Input Control Module.

1. The Input Control Module (ICM) shall monitor all system alarm inputs. The Input Modules shall be able to operate independently and in conjunction with Output Control Modules, which will send an output signal to a corresponding output device upon alarm input activation. System Administrators shall have the ability to set the following options for each input or output configured on the Input Control Modules in the system:

a. Alarm Masking:

1) This feature shall allow System Administrators to mask the alarm input manually, or on a time zone basis.

b. Local Linkage:

1) This feature shall allow System Administrators to locally link outputs with inputs that are attached to the same Input control module/Output Control Module. Inputs shall be linked to multiple outputs and outputs shall be triggered by multiple inputs.

c. Activate Output:

1) This feature shall allow System Administrators to activate an output tied to the Input control module/output control module on a time zone basis.

d. Activate Output Always:

1) This feature shall allow System Administrators to activate an output always.

e. Configuration of Debounce Times:

1) Debounce time configuration allows System Administrators to control the amount of time that an input state change must remain consistent in order for it to be considered a real change of state, and shall prevent contact "flickers" from being reported up as changes of state.

f. Configuration of Hold Times:

1) When configuring an Alarm Input, a hold time setting shall be settable from 0-15. When an input goes active and is restored, the hold time is the amount of time in seconds to wait until reporting the input activation as restored. This feature is used

when there is no advantage to log the specific number of times a point is tripped after the initial event.

D. Individual Access Control/Alarm Monitoring Processor Operation:

1. Card-reader ports of an access control processor shall be custom configurable for a minimum of [120] different card-reader or keypad formats. Multiple reader or keypad formats may be used simultaneously at different access control processors or within the same access control processor.
2. Access control processors shall provide a response to card-readers or keypad entries in less than 0.25 seconds, regardless of system size.
3. Access control processors that are reset, or powered up from a nonpowered state, shall automatically request a parameter download and reboot to its proper working state. This shall happen without any operator intervention.
4. Initial Startup: When access control/alarm monitoring processors are brought on-line, database parameters shall be automatically downloaded to them. After initial download is completed, only database changes shall be downloaded to each access control/alarm monitoring processor.
5. Failure Mode: On failure for any reason, access control/alarm monitoring processors shall perform an orderly shutdown and force access control/alarm monitoring processor outputs to a predetermined failure mode state, consistent with the failure modes shown and the associated control device.
6. Startup after Power Failure: After power is restored, startup software shall initiate self-test diagnostic routines, after which access control/alarm monitoring processors shall resume normal operation.
7. Startup after Access Control/Alarm Monitoring Processor Failure: On failure, if the database and application software are no longer resident, access control/alarm monitoring processors shall not restart, but shall remain in the failure mode until repaired. If database and application programs are resident, access control/alarm monitoring processors shall immediately resume operation. If not, software shall be restored automatically from the Server.

E. Communications Monitoring:

1. System shall monitor and report status of communications of each location.
2. Missed polls indicate that messages had to be retransmitted and reflect the soundness or quality of the access control/alarm monitoring processor-to-access control/alarm monitoring processor network.
3. Communication status window shall display which access control/alarm monitoring processors are currently communicating, a total count of missed polls since midnight, and which access control/alarm monitoring processor last missed a poll.

F. Operating systems shall include a real-time clock function that maintains seconds, minutes, hours, day, date, and month. The real-time clock shall be automatically synchronized with the central processing units a minimum of once a day to plus or minus 10 seconds. The time synchronization shall be automatic, without operator action and without requiring system shutdown.

2.8 OPERATIONS

A. Inputs in system shall have two icon representations, one for the normal state and one for the abnormal state.

B. When viewing and controlling inputs, displayed icons shall automatically change to the proper icon to display the current system state in real time. Icons shall also display the input's state, whether armed or bypassed, and if the input is in the armed or bypassed state due to a time zone or a manual command.

C. Outputs in system shall have two icon representations, one for the secure (locked) state and one for the open (unlocked) state.

D. Icons displaying status of the I/O points shall be constantly updated to show their current real-time condition without prompting by the operator.

E. The operator shall be able to scroll the list of I/Os and press the appropriate toolbar button, or right click, to command the system to perform the desired function.

F. Graphic maps or drawings containing inputs, outputs, and override groups shall include the following:

1. Database to import and store full-color maps or drawings and allow for input, output, and override group icons to be placed on maps.
2. Maps to provide real-time display animation and allow for control of points assigned to them.
3. System to allow inputs, outputs, and override groups to be placed on different maps.
4. Software to allow changing the order or priority in which maps will be displayed.

G. Operator Commands:

1. Command Input: Plain-language words and acronyms shall allow operators to use the system without extensive training or data-processing backgrounds. System prompts shall be a word, a phrase, or an acronym.
2. Command inputs shall be acknowledged, and processing shall start in not less than 1 second.
3. Tasks that are executed by operator's commands shall include the following:
   a. Acknowledge Alarms: Used to acknowledge that the operator has observed the alarm message.
   b. Place Zone in Access: Used to remotely disable intrusion alarm circuits emanating from a specific zone. System shall be structured so that console operator cannot disable tamper circuits.
   c. Place Zone in Secure: Used to remotely activate intrusion alarm circuits emanating from a specific zone.
   d. System Test: Allows the operator to initiate a system-wide operational test.
   e. Zone Test: Allows the operator to initiate an operational test for a specific zone.
   f. Print reports.
   g. Change Operator: Used for changing operators.
   h. Display Graphics: Used to display any graphic displays implemented in the system. Graphic displays shall be completed within 20 seconds from time of operator command.
   i. Run system tests.
   j. Generate and format reports.

H. Alarms:

1. System Setup:
   a. Assign manual and automatic responses to incoming point status change or alarms.
2. Animated Response Graphics: Highlight alarms with flashing icons on graphic maps; display and constantly update the current status of alarm inputs and outputs in real time through animated icons.
3. Multimedia Alarm Annunciation: WAV files to be associated with alarm events for audio annunciation or instructions.
4. Alarm Handling: Each input may be configured so that an alarm cannot be cleared unless it has returned to normal, with options of requiring the operator to enter a comment about disposition of alarm. Allow operator to silence alarm sound when alarm is acknowledged.
5. Video Surveillance Alarm Interface: Allow commands to be sent to video surveillance systems during alarms (or input change of state).
6. Camera Control: Provides operator ability to select and control cameras from graphic maps.

I. Alarm Monitoring: Monitor sensors and access control panels, and notify operators of an alarm condition. Display higher-priority alarms first and, within alarm priorities, display the oldest unacknowledged alarm first. Operator acknowledgment of one alarm shall not be considered acknowledgment of other alarms nor shall it inhibit reporting of subsequent alarms.

1. Displayed alarm data shall include type of alarm, location of alarm, and secondary alarm messages.
2. Printed alarm data shall include type of alarm, location of alarm, date and time (to nearest second) of occurrence, and operator responses.
3. Maps shall automatically display the alarm condition for each input assigned to that map, if that option is selected for that input location.
4. Alarms initiate a status of "pending" and require the following two handling steps by operators:
    a. First Operator Step: "Acknowledged." This action shall silence sounds associated with the alarm. The alarm remains in the system "Acknowledged" but "Un-Resolved."
    b. Second Operator Step: Operators enter the resolution or operator comment, giving the disposition of the alarm event. The alarm shall then clear.
5. Each workstation shall display the total pending alarms and total unresolved alarms.
6. Each alarm point shall be programmable to disallow the resolution of alarms until the alarm point has returned to its normal state.
7. Alarms shall transmit to Server in real time.
8. Alarms shall be displayed and managed from a minimum of four different windows.
    a. Input Status Window: Overlay status icon with a large red blinking icon. Selecting the icon will acknowledge the alarm.
    b. History Log Transaction Window: Display name, time, and date in red text. Selecting red text will acknowledge the alarm.
    c. Alarm Log Transaction Window: Display name, time, and date in red. Selecting red text will acknowledge the alarm.
    d. Graphic Map Display: Display a steady colored icon representing each alarm input location. Change icon to flashing red when the alarm occurs. Change icon from flashing red to steady red when the alarm is acknowledged.
9. Once an alarm is acknowledged, the operator shall be prompted to enter comments about the nature of the alarm and actions taken. Operator's comments may be manually entered or selected from a programmed predefined list, or a combination of both.
10. For locations where there are regular alarm occurrences, provide programmed comments. Selecting that comment shall clear the alarm.
11. The time and name of the operator who acknowledged and resolved the alarm shall be recorded in the database.

J. Monitor Display: Display text and graphic maps that include zone status integrated into the display. Colors are used for the various components and current data. Colors shall be uniform throughout the system.

1. Color Code:
    a. FLASHING RED: Alerts operator that a zone has gone into an alarm or that primary power has failed.
    b. STEADY RED: Alerts operator that a zone is in alarm and alarm has been acknowledged.
    c. YELLOW: Advises operator that a zone is in access.
    d. GREEN: Indicates that a zone is secure and that power is on.
2. Graphics:
    a. Support a minimum of 100 graphic display maps and allow import of maps from a minimum of 16 standard formats from a graphics program.
    b. Allow I/O to be placed on graphic maps by the drag-and-drop method.

c. Operators shall be able to view the inputs, outputs, and the point's name by moving the mouse cursor over the point on graphic map.

d. Inputs or outputs may be placed on multiple graphic maps. The operator shall be able to toggle to view graphic map associated with inputs or outputs.

e. Each graphic map shall have a display-order sequence number associated with it to provide a predetermined order when toggled to different views.

f. Camera icons shall have the ability to be placed on graphic maps that, when selected by an operator, will open a video window, display the camera associated with that icon, and provide pan-tilt-zoom control.

g. Input, output, or camera placed on a map shall allow the ability to arm or bypass an input, open or secure an output, or control the pan-tilt-zoom function of the selected camera.

K. Entry-Control Enrollment Software: Database management functions that allow operators to add, delete, and modify access data as needed.

1. Provide multiple, password-protected access levels. Database management and modification functions shall require a higher operator access level than personnel enrollment functions.

2. The program shall provide means to disable the enrollment station when it is unattended to prevent unauthorized use.

3. The program shall provide a method to enter personnel identifying information into the entry-control database files through enrollment stations. In the case of personnel identity verification subsystems, this shall include biometric data. Allow entry of personnel identifying information into the system database using menu selections and data fields. The data field names shall be customized during setup to suit user and site needs. Personnel identity verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry-control database files.

4. Cardholder Data: Provide 99 user-defined fields. System shall have the ability to run searches and reports using any combination of these fields. Each user-defined field shall be configurable, using any combination of the following features:

a. MASK: Determines a specific format that data must comply with.

b. REQUIRED: Operator is required to enter data into field before saving.

c. UNIQUE: Data entered must be unique.

d. DEACTIVATE DATE: Data entered will be evaluated as an additional deactivate date for all cards assigned to this cardholder.

e. NAME ID: Data entered will be considered a unique ID for the cardholder.

5. Personnel Search Engine: A report generator with capabilities such as search by last name, first name, group, or any predetermined user-defined data field; by codes not used in definable number of days; by skills; or by seven other methods.

6. Multiple Deactivate Dates for Cards: User-defined fields to be configured as additional stop dates to deactivate any cards assigned to the cardholder.

7. Default card data can be programmed to speed data entry for sites where most card data are similar.

8. Enhanced ACSII File Import Utility: Allows the importing of cardholder data and images.

9. Card Expire Function: Allows readers to be configured to deactivate cards when a card is used at selected devices.

L. Access control/alarm monitoring processors shall be capable of communicating with the host computer and other panels via RS232, RS485, fiberoptics and LAN/WAN - TCP/IP.

2.9 SYSTEM DATABASE

A. Time Zones:

1. Each zone consists of a start and stop time for 7 days of the week and three holiday schedules. A time zone is assigned to inputs, outputs, or access levels to determine when

an input shall automatically arm or disarm, when an output automatically opens or secures, or when access authorization assigned to an access level will be denied or granted.

2. Four time zones may be assigned to inputs and outputs to allow four arm or disarm periods per day or four lock or unlock periods per day; three holiday override schedules may be assigned to a time zone.
3. Data-entry window shall display a dynamically linked bar graph showing active and inactive times for each day and holiday, as start and stop times are entered or edited.

B. Holidays:

1. Three different holiday schedules may be assigned to a time zone. Holiday schedule consists of date in format MM/DD/YYYY and a description. When the holiday date matches the current date of the time zone, the holiday schedule replaces the time zone schedule for that 24-hour period.
2. Three separate holiday schedules may be applied to a time zone.
3. Holidays have an option to be designated as occurring on the designated date each year. The holidays remain in system and will not be purged.
4. Holidays not designated to occur each year shall be automatically purged from database after the date expires.

C. Access Levels:

1. One level shall be predefined as the Master Access Level. The Master Access Level shall work at all doors at all times and override any anti-passback.
2. System shall allow for access to be restricted to any area by reader and by time. Access levels shall determine when and where an Identifier is authorized.
3. System shall have the ability to create multiple door and time zone combinations under same access level so that an Identifier may be valid during different time periods at different readers even if the readers are on the same Access control panel.

D. User-Defined Fields:

1. System shall provide a minimum of 99 user-defined fields, each with 50 characters, for specific information about each credential holder.
2. System shall accommodate a title for each field; field length shall be 20 characters.
3. A "Required" option may be applied to each user-defined field that, when selected, forces the operator to enter data in the user-defined field before the credential can be saved.
4. A "Unique" option may be applied to each user-defined field that, when selected, will not allow duplicate data from different credential holders to be entered.
5. Data format option may be assigned to each user-defined field that will require the data to be entered with certain character types in specific spots in the field entry window.
6. A user-defined field, if selected, will define the field as a deactivate date. The selection shall automatically cause the data to be formatted with the windows MM/DD/YYYY date format. The credential of the holder will be deactivated on that date.
7. A search function shall allow any one user-defined field or combination of user-defined fields to be searched to find the appropriate cardholder. The search function shall include search for a character string.
8. System shall have the ability to print cardholders based on and organized by the user-defined fields.

E. Code Tracing:

1. System shall perform code tracing selectable by cardholder and by reader.
2. Any code may be designated as a "traced code" with no limit to how many codes can be traced.
3. Any reader may be designated as a "trace reader" with no limit to which or how many readers can be used for code tracing.

4. When a traced code is used at a trace reader, the access-granted message that usually appears on the monitor window of the monitoring station shall be highlighted with a different color than regular messages. A short singular beep shall occur at the same time the highlighted message is displayed on the window.
5. The traced cardholder image (if image exists) shall appear on workstations when used at a trace reader.

2.10 CARD READER FUNCTIONS

A. The system shall support a variety of card readers that must encompass a wide functional range. The system may combine any compatible card readers for installations requiring multiple types of card reader capability (i.e., card only, card and/or PIN, supervised inputs, etc.). Card readers shall be available in Open Supervised Device Protocol (OSDP) output format and Wiegand. All card readers shall include card reader back boxes for conduit installations.

B. The use of keypads with the card reader will require the user to enter a personal identification number in conjunction with the card to obtain authorized access.

2.11 READERS

A. Contactless SmartCard 13.56 MHz Technology.

B. Exterior readers shall be weatherproof. Seal all openings and penetrations with manufacturer approved sealant.

C. No special housing shall be required for those readers designated for outdoor use.

D. Electrical connections and cabling from the reader assembly to the system interface shall be per manufacturer's specifications.

E. All card readers shall be installed on an electrical include electrical back boxes for conduit installations.

F. Card readers shall provide audible feedback to indicate access granted/denied decisions. Upon a card swipe, two beeps shall indicate access granted and three beeps shall indicate access denied. All keypad buttons shall provide tactile audible feedback.

2.12 CARDS / CREDENTIALS

A. Combination Proximity and 16k bit (2k Byte), 13.56 MHz read/write contactless smart card technology. The Smart Card Technology shall have the following features:

1. Sufficient read/write memory to store multiple biometric templates.
2. 16k available in a two or sixteen application area configuration. 32k available with 16k memory configured in either 2 or 16 application areas, plus an additional 16k user configurable memory.
3. Multiple securely separated files enable numerous applications, including the HID standard access control application, and support future growth.
4. Complies with ISO 15693 and 14443B for contactless communications.

B. Card Dimensions: 3-3/8 inches x 2-1/8 inches.

C. Provide for future card modifications to include custom artwork, laminated photo I.D., and slot punching for strap or chain, without requiring replacement of card.

2.13 PIN READERS

A. Pin keypad shall be an integral part of the reader at pin-reader locations. The reader shall require an authorized user to enter a personal identification number in conjunction with the use of the card to obtain access.

2.14 REQUEST TO EXIT MOTION DETECTOR

A. The request to exit motion detector shall include as a minimum the following features:

1. Dual technology passive infrared and microwave.
2. Adjustable time delay.

3. Tamper output.
4. Microwave frequency: 5.8 GHz.
5. Range, depth: 3 to 15 feet, adjustable.
6. Range, width: 7.9 feet.
7. Range, PIR: 15 feet (4.6 m), adjustable.
8. Relay output - Form “C”.
9. Approximate dimensions (HxWxD): 1.76 x 7.395 x 1.85 inches.
10. Provide a trim plate to mount between the request to exit motion and the mounting surface. The trim plate shall be approximately 1/8 inches in depth, and shall be sized approximately 1/2 inch - 3/4 inches larger than the motion detector mounting surface and large enough to cover the backbox opening. The trim plate shall be supplied by the manufacturer. If a trim plate is not available from the manufacturer, one shall be fabricated using ABS plastic. The trim plate color shall match the existing surface.

2.15 ACTIVITY/REPORT PRINTER

A. The laser printer shall meet the following minimum requirements:

1. Minimum 27 pages/minute.
2. Equipped with a 16 meg internal buffer memory.
3. Minimum Print Quality: 600 x 600 dpi.
4. Minimum Tray Capacity: 125 sheets.
5. USB 2.0 and Ethernet connection.

2.16 MOTION DETECTION SENSORS

A. Ceiling Mounted.

1. Dual optic technology.
2. 60 feet diameter coverage.
3. Ceiling mount.
4. 360 degree coverage.
5. Mask all unused curtain areas.
6. Utilize recessed mounting kit.
7. Powered by 7 to 18 volts DC.

B. Wall Mounted:

1. Dual Tech: (Honeywell DT7450 basis of design)
2. Passive infrared motion detector with self-contained microprocessor employing dual technology motion detection.
3. Integral bug guard.
4. Form C, 125mA max, 25VDC (minimum) alarm output.
5. Integral combination cover/ tamper switch.
6. Digitally adjust thresholds to account for room disturbances
7. Fresnel lens shall provide the same sensitivity for human targets at the edge of the pattern as exists directly in front of the sensor.
8. Continuous internal signal diagnostic supervision.
9. PIR supervision performed once every hour.
10. Temperature compensation monitored and updated every 30seconds.
11. Additional minimum requirements:
    a. Range: 50 feet x 60 feet (short range - wall mounted), 100 inches x 25 feet (long range - wall mounted), 50 feet x 360 degree (ceiling mounted)
    b. Alarm Relay: Energized Form C @125 mA, 25 VDC, w/20 Ohm series resistor.

c. Tamper: (NC) 50 mA, 24 VDC.
d. Power Requirements: 8.0 - 16 VDC.
e. Frequency: 24.125 GHz (K-Band).
f. PIR White Light Immunity: 6,500 lux typical.
g. Fluorescent Light Filter: 50 Hz or 60 Hz, selectable.
h. RFI Immunity: 30 V/m, 10 MHz - 1000 MHz.
i. Operating Temperature: 14 degrees to 131 degrees F @ 5 percent - 95 percent relative humidity (non-condensing)
j. PIR Fields of View: 22 long range edges, 12 intermediate edges, Six lower edges.
k. Four look-down edges.
l. Maximum Dimension: 4.685 inches x 2.795 inches x 1.654 inches.
m. Sensitivity: Standard: 3-4 steps Intermediate: 2-3 steps.

2.17 DOOR POSITION SWITCHES

A. Magnetic door position switches - Recessed - Magnasphere model MSS Series used as Basis of Design, any/all substitution request shall meet the following criteria:

1. Recessed mounted magnetic switches.
2. 1 inches diameter self-locking.
3. UL 634 Listed.
4. Resistant to defeat by placing magnet against frame.
5. Resistant to arcing and fusing from lighting and voltage spikes.
6. Weatherproof, fully sealed.
7. 0.25 Watt contact rating.
8. Double Pole-Single Throw (DPST)
9. Closed-loop configuration.
10. Coordinate color to match door frame.

B. Magnetic door position switches - Surface Mount - Magnasphere model MSS Series used as Basis of Design, any/all substitution request shall meet the following criteria:

1. Anodized aluminum housing.
2. UL 634 Listed.
3. Resistant to defeat by placing magnet against frame.
4. Resistant to arcing and fusing from lighting and voltage spikes.
5. Weatherproof, fully sealed.
6. 0.25 Watt contact rating.
7. Double Pole-Single Throw (DPST)
8. 24 inches Armored Cable.
9. Closed-loop configuration.
10. Coordinate color to match door frame.

2.18 ACCESS CONTROL AND DOOR HARDWARE POWER SUPPLIES

A. Power Supplies for door hardware and access control hardware shall be designed specifically for the system equipment installed. Power supplies shall be regulated, isolated versions for the access control panel, I/O Modules, Readers, Door Locking Hardware and the security monitoring peripheral equipment. Each version shall be available in UPS with battery back-up and non-UPS models. All power supplies shall be housed in locked enclosures that also allow mounting space for the access control panels, I/O Modules, single reader modules, dual interface modules or other device/panel required.

1. Provide separate power supplies for the access control equipment and door locking hardware.

2. The power supplies shall be UL listed for use with the specified access control system.
3. Electric lock power supplies shall be UL listed for use with the specified lock manufacturer.
    a. Coordinate with Division 08 for electric lock manufacturer.
    b. The Contractor has the option to combine more than one door on one power supply. Coordinate with Division 08, the power requirements for each lock to determine the size of power supply required.
4. Power supplies for doors with high current electric latch retraction will be provided by Division 08.

2.19 SURGE AND TAMPER PROTECTION

A. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

B. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal at the security monitoring screen when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.

PART 3 - EXECUTION

3.1 PREPARATION

A. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and submit as Project planning documents for review and approval by Owner and Architect.

1. Record setup data for control station and workstations.
2. For each location, record setup of Access control panel features and access requirements.
3. Propose start and stop times for time zones and holidays, and match up access levels for doors.
4. Set up groups, facility codes, linking, and list inputs and outputs for each Access control panel.
5. Assign action message names and compose messages.
6. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
7. Prepare and install alarm graphic maps.
8. Develop user-defined fields.
9. Develop screen layout formats.
10. Complete system diagnostics and operation verification.
11. Prepare a specific plan for system testing, startup, and demonstration.
12. Develop acceptance test concept and, on approval, develop specifics of the test.
13. Develop cable and asset management system details; input data from construction documents. Include system schematics and Visio Technical Drawings.

B. In meetings with Architect and Owner, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.

3.2 INSTALLATION

A. Comply with the requirements of Section 28 05 01.

B. Coordinate all work with the Owner prior to the commencement of the scope of work as specified herein.

C. Apply for, and obtain any and all permits required by federal, state, county, city, or other authority having jurisdiction over the work.

D. Install and terminate all security circuits to the door hardware supplied and installed by Division 08. Coordinate with the Division 08 contractor the installation and termination of all cabling and security devices.

E. Coordinate the conduit/raceway installation with the Division 26 contractor. Conduit to be provided beyond what is shown on the [EY] series project drawings shall be the responsibility of the Security Contractor.

F. Install equipment and devices in accordance with manufacturer's specifications.

G. Coordinate with the Owner the complete system configuration requirements of the Owner.

1. The installer/contractor shall be responsible for configuring/programming the system to meet the operational requirements of the Owner.

H. Install readers and integrate into special assemblies as may be required for elevator call panels, narrow jamb frames and pedestal mounts.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspections

1. Test and inspect all system components and cabling to assure compliance with manufacturer's requirements for operation in accordance with the requirements in Section 28 05 01.

3.4 SYSTEM STARTUP

A. Coordinate requirements of this Section with Section 01 75 00 – Checkout and Startup Procedures when applicable.

B. Coordinate with the manufacturer's services and requirements.

3.5 DEMONSTRATION AND TRAINING

A. Comply with requirements in Section 28 05 01.

END OF SECTION

SECTION 32 31 13
CHAIN LINK FENCE AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Chain link fencing and gates.

B. Related Requirements:

1. Section 03 00 05 - Concrete.
2. Section 31 23 01 - Earth Moving.
3. Section 31 23 05 - Excavation and Fill.
4. Section 31 23 33 - Trenching and Backfilling.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   b. A392, Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
   c. A824, Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use with Chain-Link Fence.
   d. F552, Standard Terminology Relating to Chain Link Fencing.
   e. F567, Standard Practice for Installation of Chain-Link Fence.
   f. F626, Standard Specification for Fence Fittings.
   g. F900, Standard Specification for Industrial and Commercial Steel Swing Gates.
   h. F1043, Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework.
   i. F1083, Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
2. American Welding Society (AWS).
3. National Fire Protection Association (NFPA):
   a. NFPA 70, National Electrical Code (NEC).
4. Underwriters Laboratories, Inc. (UL).

B. Qualifications:

1. Installer bonded and licensed in the Project state.
2. Installer shall have a minimum two years experience installing similar fencing.
3. Utilize only AWS certified welders.
4. Electric gate operators to be UL listed.
5. Grounding by an electrician licensed in Project state.

1.3 DEFINITIONS

A. See ASTM F552.

B. NPS: Nominal pipe size, in inches.

C. Installer or Applicator:

1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.

2. Installer and applicator are synonymous.

1.4 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
2. Scaled plan layout showing spacing of components, accessories, fittings, and post anchorage.
3. Mill certificates.
4. Source quality control test results.
5. Automatic gate system:
   a. Electrical circuitry and control wiring.
   b. Intercom system.
   c. Detector loop layout.
   d. Locking plan.
   e. Method of installation of detector loop.
   f. Sealant material for detector loops.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Chain Link Fabric:

1. Fabric type:
   a. ASTM A392 zinc-coated steel:
      1) Coated before weaving, 2.0 oz/SQFT.
2. Wire gage: [6] [9] [11].
3. Mesh size: [1] [1-1/4] [1-3/4] [2] inches.
4. Selvage treatment:
   a. Top: [Knuckled] [Twisted and barbed].
   b. Bottom: [Knuckled].

B. Concrete: See Section 03 00 05 - Concrete.

C. Line Post:

1. ASTM F1083 pipe:
   a. Schedule [40] [80], NPS 2.

D. Corner or Terminal Posts:

1. ASTM F1083 pipe:
   a. Schedule [40] [80], NPS 2-1/2.

E. Brace and Rails:

1. ASTM F1083 pipe:
   a. Schedule [40] [80], NPS 1-1/4.

F. Tension Wire:

1. [Top] [Top and bottom] of fabric:
   a. ASTM A824, galvanized steel, Class 3.

G. Fence Fittings (Post and Line Caps, Rail and Brace Ends, Sleeves-Top Rail, Tie Wires and Clips, Tension and Brace Bands, Tension Bars, Truss Rods):

1. ASTM F626.

H. Swing Gate:

1. ASTM F900.
2. Materials as specified for fence framework and fabric.
3. Hardware:
   a. Galvanized per ASTM A153/A153M.
   b. Hinges to permit [180 degrees inward] [180 degrees outward] [90 degrees in and out] gate opening.

2.2 SOURCE QUALITY CONTROL

A. Test related fence construction materials to meet the following standards:

1. Posts and rails: ASTM F1043, Heavy Industrial.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with:

1. Manufacturer's instructions.
2. Lines and grades shown on Drawings.
3. ASTM F567.

B. Do not start fence installation before final grading is complete and finish elevations are established.

C. Drill holes in firm, undisturbed or compacted soil.

D. Place fence with bottom edge of fabric at maximum clearance above grade, as shown on Drawings.

1. Correct minor irregularities in earth to maintain maximum clearance.

E. Space line posts at equal intervals not exceeding 10 feet on-center.

F. Provide post braces for each gate, corner, pull and terminal post and first adjacent line post.

G. Install tension bars full height of fabric.

H. Rails:

1. Fit rails with expansion couplings of outside sleeve type.
2. Rails continuous for outside sleeve type for full length of fence.

I. Provide expansion couplings in top rails at not more than 20 feet intervals.

J. Anchor top rails to main posts with appropriate wrought or malleable fittings.

K. Install bracing assemblies at all end and gate posts, as well as side, corner, and pull posts.

1. Locate compression members at mid-height of fabric.
2. Extend diagonal tension members from compression members to bases of posts.
3. Install so that posts are plumb when under correct tension.

L. Pull fabric taut and secure to posts and rails.

1. Secure so that fabric remains in tension after pulling force is released.
2. Secure to posts at not over 15 inches on-center, and to rails at not over 24 inches on-center, and to tension wire at not over 24 inches on-center.
3. Use U-shaped wire conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least two full turns.
4. Bend ends of wire to minimize hazards to persons or clothing.

M. Install post top at each post.

N. Gates:

1. Construct with fittings or by welding.
2. Provide rigid, weatherproof joints.
3. Assure right, non-sagging, non-twisting gate.
4. Coat welds with rust preventive paint, color to match pipe.

O. Install solar powered electric gate operator in accordance with NFPA 70.

END OF SECTION

WHY ARE FLUSH RESTROOMS IMPORTANT?

Your visitors expect quality restrooms. Bad restrooms hurt your image and bottom line.

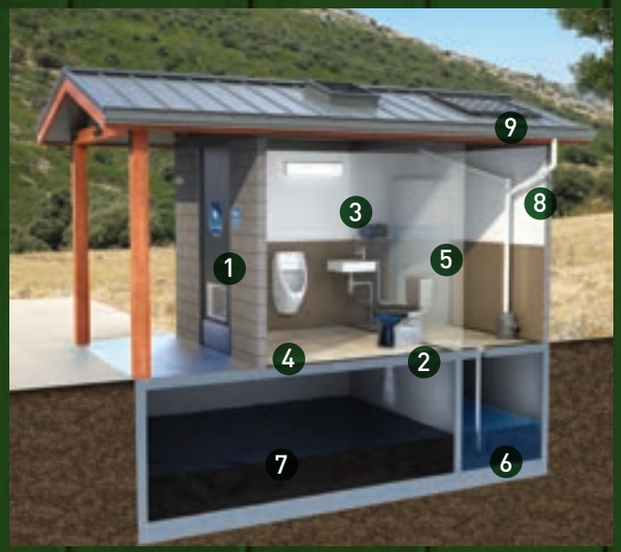
www.greenflushrestrooms.com

FULLY MODULAR

- Factory & Commercial Quality
- Standard Plans Save Time & Money
- Permanently Installed in a Day
- Come With Complete Precast Foundations
- Meets All ADA, Local, and Energy Codes

PLUMBED RESTROOMS

OR



1. Factory built restroom set in one day
2. Ultra low flow flush toilet
3. Handwash sink
4. Waterless urinal
5. Sink water tank
6. Flush water vault
7. Waste water holding vault
8. Optional rain water collection system
9. Solar panel

SELF-CONTAINED FLUSH RESTROOMS

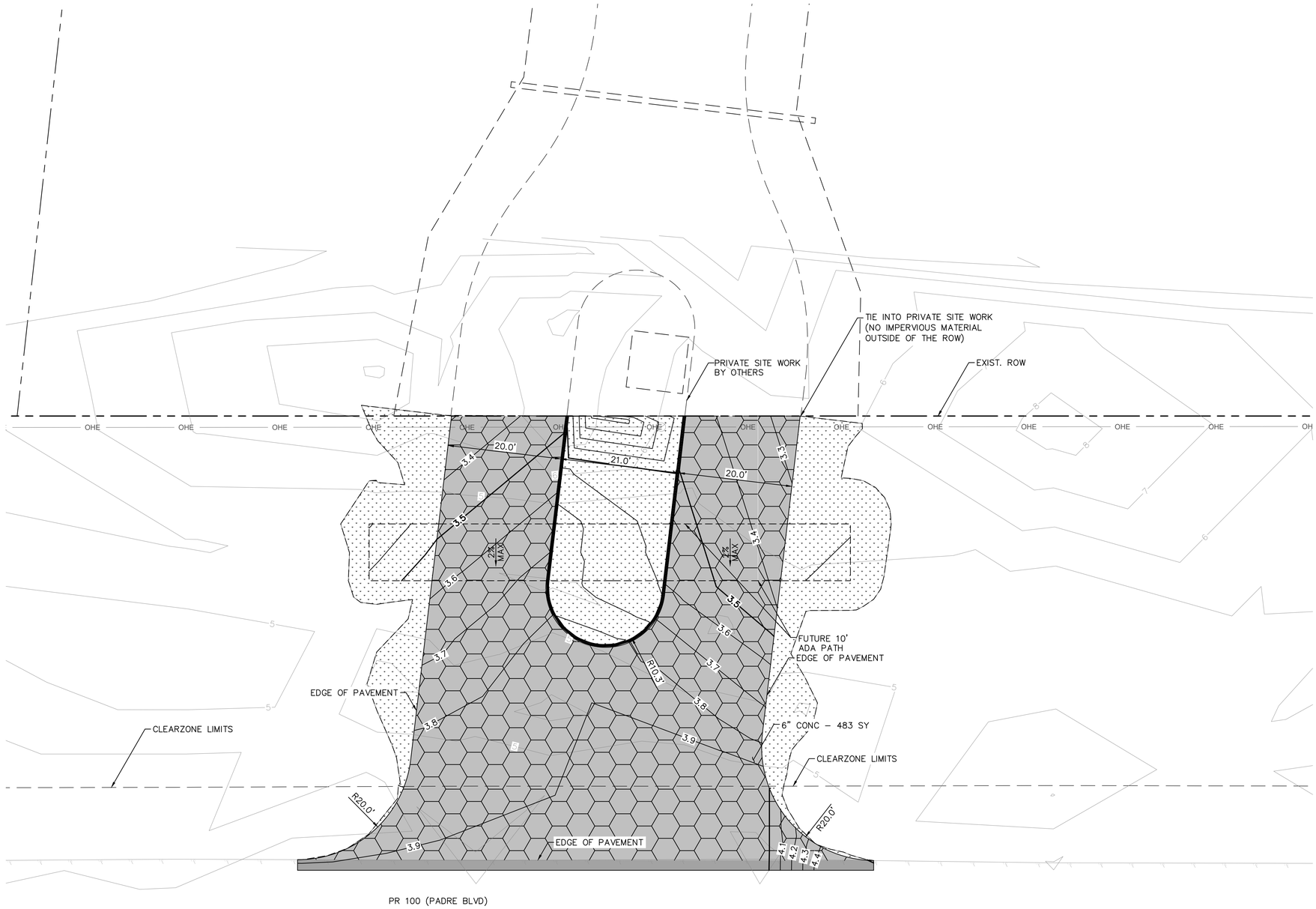
Self Contained Flush Restroom Specifications

Description: Two single-occupancy cabins each with a toilet and sink, and one mechanical room.

Type: Double.
Style: Durango II
Exterior: Precision Block
Roof: Metal Roof, Color Polar, w/ Skylight
Interior: Painted Block Wall, Concrete Floor, Water Efficient Porcelain Toilet, Porcelain Sink, Toilet Paper Dispenser, Paper Towel Dispenser and Soap Dispenser

ACCESSORIES included per KIT

Pdt.	Material	Item #	Color	Weight (lbs/sqft)	Dimensions		Roll Weight (lbs)	Diameter (in)	Accessories & Benefits				
					Width (ft)	Length (ft)			Grommet	Spike	Plug	Carrying Strap	Safe edge
AccessMat®	100% NON WOVEN Polyester roll	AM3-33	Blue or Brown	0.455	3	33	45	10	10	20	7	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM3-50	Blue or Brown	0.455	3	50	68	11	12	22	7	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM3-75	Blue or Brown	0.455	3	75	102	12	16	26	7	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM3-100	Blue or Brown	0.455	3	100	137	13	20	30	7	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM3-SQ	Blue or Brown	0.455	3	3	16	-	0	0	0	0	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM5-33	Blue or Brown	0.455	5	33	75	10	10	24	9	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM5-50	Blue or Brown	0.455	5	50	105	11	12	26	9	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM5-75	Blue ~~or Brown~~	0.455	5	75	171	12	16	30	9	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM5-100	Blue or Brown	0.455	5	100	228	13	20	34	9	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM5-SQ	Blue or Brown	0.460	5	5	32	-	0	0	0	0	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM6-33	Blue or Brown	0.455	6	33	90	10	10	28	11	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM6-50	Blue or Brown	0.455	6	50	137	11	12	30	11	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM6-75	Blue or Brown	0.455	6	75	205	12	16	34	11	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM6-100	Blue or Brown	0.455	6	100	273	13	20	38	11	2	Yes
AccessMat®	100% NON WOVEN Polyester roll	AM6-SQ	Blue or Brown	0.460	6	6	41	-	0	0	0	0	Yes



GRAPHIC SCALE IN FEET
0 5 10 20

LEGEND

- PROP SOD
- 4" CONC SIDEWALK
- 6" CONC DRIVEWAY
- PROP GRAVEL BACKFILL
- DETECTABLE WARNING SURFACE
- R — RAMP (8.33% MAX RUNNING SLOPE, 2% MAX CROSS SLOPE)
- L — LANDING (2% MAX RUNNING SLOPE, 2% MAX CROSS SLOPE)
- EXISTING PAVEMENT SLOPE
- PROPOSED PAVEMENT SLOPE

No.	Revision	By	Date

03/04/2026

STATE OF TEXAS
BRIAN J. LEE
142043
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn

TBPE REGISTERED ENGINEERING FIRM F-928

South Padre ISLAND

Texas Department of Transportation

PR 100 SIDEWALK AND DRIVEWAY IMPROVEMENTS AT WIND & WATER SPORTS

DRIVEWAY DETAILS

DEVELOPMENT DRIVEWAY

WWS STA 13+00

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	N/A	PR 100

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHR	CAMERON	027
CONTROL	SECTION	JOB	
N/A	N/A	N/A	

DATE: 3/4/2026 12:42 PM BY ANDREW.CASHMAN
FILE: K:\LAC_TPTO\PROJECT\069234003_SPI_PADRE_BLVD_MEDIANS\WINDSPORTS\CADD\PLANSHEETS\DRIVEWAY DETAILS.DWG

GENERAL NOTES AND SPECIFICATIONS DATA:

USE A POWER-BROOM WHEN CLEANING THE ROADWAY AS NEEDED.

REMOVE & DISPOSE ALL MATERIAL NOT DEEMED SALVAGEABLE BY THE OWNER, UNLESS OTHERWISE SHOWN ON THE PLANS.

ON EXISTING PAVEMENT THAT WILL REMAIN IN PLACE, SAND BLAST (NO WATERBLASTING) IN ORDER TO REMOVE EXISTING STRIPING.

DO NOT BLOCK DRAINAGE WHEN HANDLING & STOCKPILING EXCAVATED MATERIAL.

MAINTAIN ACCESS TO DRIVEWAYS AND INTERSECTIONS THROUGH ALL PHASES OF CONSTRUCTION.

MAINTAIN POSITIVE DRAINAGE DURING ALL PHASES OF CONSTRUCTION.

ALWAYS COMPLETE THE PROPOSED DRIVEWAYS DURING THEIR TCP PHASE BEFORE SWITCHING TRAFFIC TO A NEW PHASE UNLESS DIRECTED BY THE OWNER.

TRAFFIC CONTROL DEVICES:

AT THE COMMENCEMENT OF THE PROJECT, ALL TRAFFIC CONTROL DEVICES SHALL BE IN ACCEPTABLE CONDITION, AND MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT, AS PER GUIDELINES FOR TEMPORARY TRAFFIC CONTROL DEVICES AND FEATURES.

CONTRACTOR SHALL NOTIFY THE CITY AND TXDOT AREA ENGINEER(AE) IN WRITING(E-MAIL IS ACCEPTABLE) AT LEAST 5 DAYS IN ADAVANCE OF PROPOSED TRAFFIC CONTROL PLANS(TCP) AND 2 DAYS IN ADVANCE OF INSTALLING ALL TRAFFIC CONTROL DEVICES PER PLANS ON THE PROJECT SO THAT TxDOT, CITY, AND CONTRACTOR CAN SCHEDULE AN INSPECTION ON THE SAID TCP AND TRAFFIC CONTROL DEVICES. COMMENCEMENT OF WORK WILL NOT BE AUTHORIZED NOR ALLOWED UNTIL CITY AND TxDOT NOTIFIES THE CONTRACTOR TO PROCEED WITH THE WORK.

CONTRACTOR SHALL HAVE A SUFFICIENT AMOUNT OF TRAFFIC CONTROL DEVICES IN ACCEPTABLE CONDITION TO REPLACE ANY DAMAGED TRAFFIC CONTROL DEVICE WITHIN 24 HOURS OF NOTIFICATION.

PROVIDE ADDITIONAL SIGNS AND BARRICADES AS NECESSARY TO ADDRESS FIELD CONSTRUCTIBILITY & VISIBILITY. THESE ADDITIONAL SIGNS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502 6001.

REMOVE OR COMPLETELY COVER ALL EXISTING SIGNS WHICH ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLAN.

ADJUST STOP SIGNS AS NEEDED ON INTERSECTING STREETS DURING THE VARIOUS CONSTRUCTION PHASES. DO NOT REMOVE ANY EXISTING STOP SIGNS UNTIL TEMPORARY SIGNS ARE IN PLACE.

COORDINATE THE TRAFFIC CONTROL PLAN AND THE VARIOUS SEQUENCES OF CONSTRUCTION WITH ADJACENT CONSTRUCTION PROJECTS IF APPLICABLE, TO ENSURE THE UNINTERRUPTED AND SAFE FLOW OF TRAFFIC.

NOTIFY THE CITY AND ENGINEER IN WRITING WHEN MAJOR TRAFFIC CHANGES ARE TO BE MADE. NOTIFICATIONS MUST BE GIVEN A MINIMUM OF THREE WORKING DAYS PRIOR TO THE CHANGE.

ALL WORK ZONE PAVEMENT MARKINGS FOR THIS PROJECT SHALL BE 0.100 INCHES (100 MIL) THICK THERMOPLASTIC.

SAFETY:

PROTECT EXPOSED PITS THAT MUST REMAIN OPEN DURING NON-WORKING HOURS AS PER OSHA REQUIREMENTS.

PROJECT SPECIFIC NOTES:

MAINTAIN ACCESS TO ALL PROPERTIES AT ALL TIMES. FOR PROPERTIES WITH A SINGLE DRIVE, DRIVEWAYS SHALL BE CONSTRUCTED SO THAT ONE HALF OF THE DRIVE IS OPEN AT ALL TIMES. FOR PROPERTIES WITH TWO DRIVES, DRIVEWAY CONSTRUCTION SHALL BE PHASED SO THAT ONE DRIVE IS OPEN AT ALL TIMES. FOR NARROW SINGLE DRIVES, IF CONSTRUCTING THE DRIVE IN TWO HALVES WILL NOT ALLOW ACCESS TO THE PROPERTY, TEMPORARY ALL-WEATHER ACCESS SHALL BE PROVIDED. NO PORTION OF ANY DRIVE SHALL BE CLOSED FOR A PERIOD LONGER THAN 14 CALENDAR DAYS. FOR PROPERTIES WITH PARKING ACCESSED DIRECTLY FROM PR 100 (PADRE BOULEVARD), CONSTRUCTION IN ACCESS AREA SHALL BE CONSTRUCTED SO THAT ONE HALF OF THE ACCESS AREA IS OPEN AT ALL TIMES. TEMPORARY, ALL-WEATHER DRIVE AND PARKING ACCESS IS ALLOWED. WORKING HOURS IS DEFINED AS MONDAY-FRIDAY 7:00 AM-6:00PM EXCLUDING DAYS IDENTIFIED IN THE SEQUENCE OF CONSTRUCTION.

PR 100 (PADRE BLVD) SHALL BE OPEN TO ONE LANE OF TRAFFIC IN EACH DIRECTION AT ALL TIMES. WEEKDAY CLOSURES OF THE INSIDE TRAVELING LANE ARE ALLOWED DURING WORKING HOURS. NO LANE CLOSURES ARE ALLOWED OVERNIGHT. NO VEHICLE OR BICYCLE LANE CLOSURES ARE ALLOWED ON PR 100 (PADRE BOULEVARD) FROM FRIDAY AT 7:00PM THROUGH MONDAY AT 7:00AM, WITHOUT APPROVAL FROM THE CITY. CONTRACTOR SHALL ENSURE A SAFE EDGE CONDITION ADJACENT TO THE ROADWAY AT ALL TIMES. ANY DEVIATION FROM THESE GUIDELINES SHALL REQUIRE WRITTEN APPROVAL FROM THE ENGINEER.

AT NO TIME SHALL EXISTING PEDESTRIAN ROUTES BE CLOSED IN BOTH THE NORTHBOUND AND SOUTHBOUND DIRECTION WITHIN A SINGLE PHASE OF WORK. ANY WORK THAT REQUIRES CLOSURE OF SIDEWALKS SHALL REQUIRE PEDESTRIAN DETOURS, WHICH MUST BE PROVIDED AT ALL TIMES UNLESS OTHERWISE NOTED.

CONTRACTOR SHALL SAWCUT AT PROPOSED IMPROVEMENT LOCATIONS ADJACENT TO EXISTING CONCRETE PAVED AREA TO PRESERVE THE EXISTING CONDITION. CONTRACTOR SHALL PROTECT ALL EXISTING IMPROVEMENTS ADJACENT TO THE WORK AREA. ALL SAWCUTS SHALL BE SUBSIDIARY TO ITEM 100 6002.

CONTRACTOR SHALL PROVIDE TEMPORARY FENCING TO PROTECT PEDESTRIANS FROM ANY ACTIVE WORK SITE AREA SUBSIDIARY TO ITEM 502 6001.

CONTRACTOR SHALL PROVIDE BARRICADES AND SIGNAGE TO PREVENT VEHICULAR TRAFFIC ON FROM ENTERING ANY ACTIVE WORK SITE AREA SUBSIDIARY TO ITEM 502 6001.

ALL BARRICADES, WARNING SIGNS, LIGHT DEVICES, ETC. FOR THE GUIDANCE AND PROTECTION OF TRAFFIC AND PEDESTRIANS MUST CONFORM TO THE INSTALLATION OF SAID DEVICES AS SHOWN IN THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, AS CURRENTLY AMENDED, AND AS PUBLISHED BY THE TEXAS DEPARTMENT OF TRANSPORTATION.

ALL TEMPORARY SIGNS, BARRICADES AND OTHER MISCELLANEOUS TRAFFIC CONTROL MEASURES SHALL BE REMOVED AT THE END OF THE CONTRACTOR'S CONSTRUCTION OPERATIONS.

ALL ADVANCE WARNING SIGNS SHALL BE PLACED IN ACCORDANCE WITH TXDOT STANDARD BC (2)-14.
PLACE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH TXDOT STANDARD TCP (2-4)-18.
PAVEMENT MARKINGS ARE TO BE INSTALLED IN ACCORDANCE WITH TXDOT STANDARD BLPM-10 AND PM (1-3)-12.
TRAFFIC SIGNS TO BE CONSTRUCTED IN ACCORDANCE WITH TXDOT STANDARDS TSR(3)-13, TSR(4)-13,TSR (5)-13, BLPM-10, PM(1)-12, PM(2)-12. PM(3)-12, SMD(GEN)-08, SMD(SLIP-1)-08, SMD(SLIP-2)-08 AND SMD(SLIP-3)-08.

02/27/2026

STATE OF TEXAS
BRIAN J. LEE
142043
LICENSED
PROFESSIONAL ENGINEER

TRAFFIC CONTROL PLAN GENERAL NOTES (MOD)

SHEET 1 OF 1 SHEETS

PHARR DISTRICT STANDARD

Texas Department of Transportation

Rev 03/22/2017

STATE	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS	6				013
DIST.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
PHR	CAMERON	N\A	N\A	N\A	PR 100

BARRICADE AND CONSTRUCTION (BC) 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 as shown in the plans. 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" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. 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.

8. 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.

9. 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.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. 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.

WORKER SAFETY NOTES:

1. 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.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

DATE:
FILE:

SHEET 1 OF 12

Texas Department of Transportation

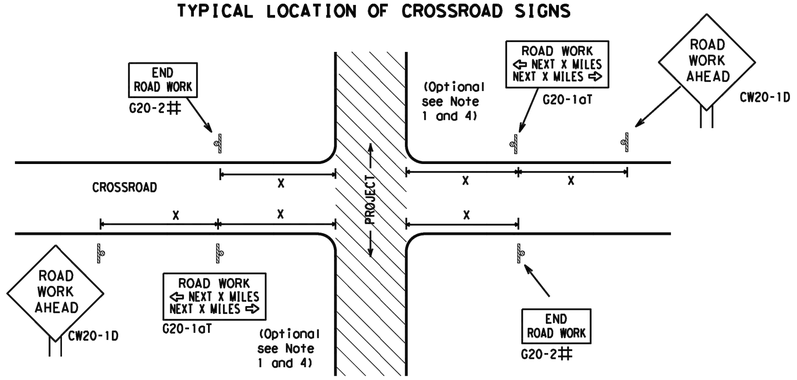
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	DIST	COUNTY		SHEET NO. 014

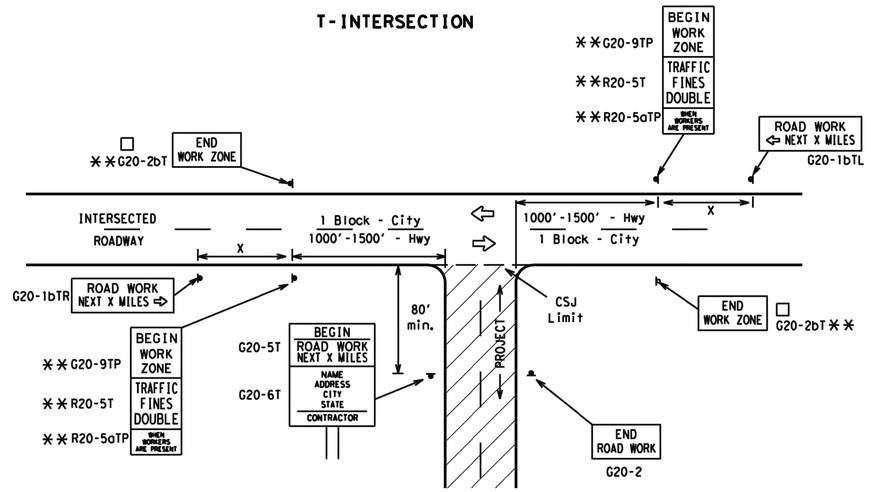
TYPICAL LOCATION OF CROSSROAD SIGNS



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 as per TMUTCD Part 5. 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, Traffic Control Plan sheets or the Work 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. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ 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 called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
*	*[3]

* 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.

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

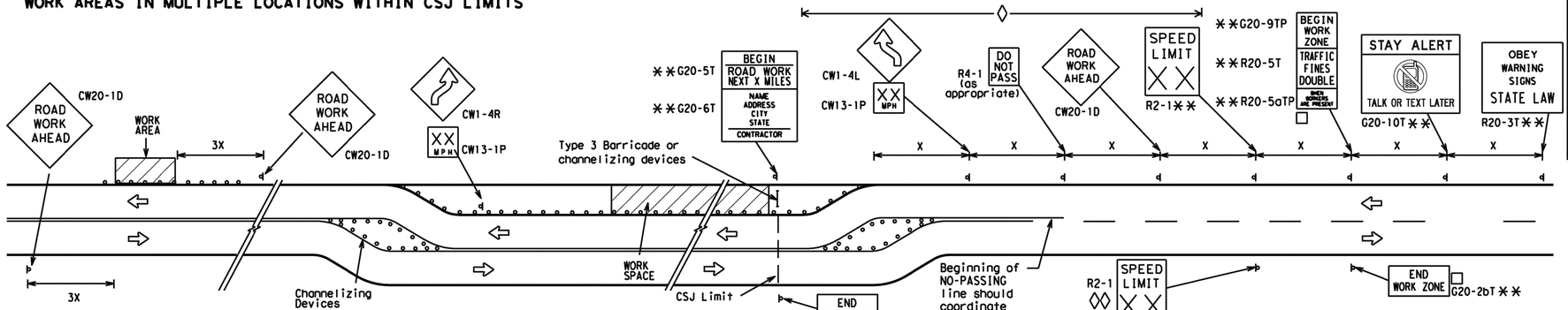
GENERAL NOTES

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 as per TMUTCD Part 5. 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.

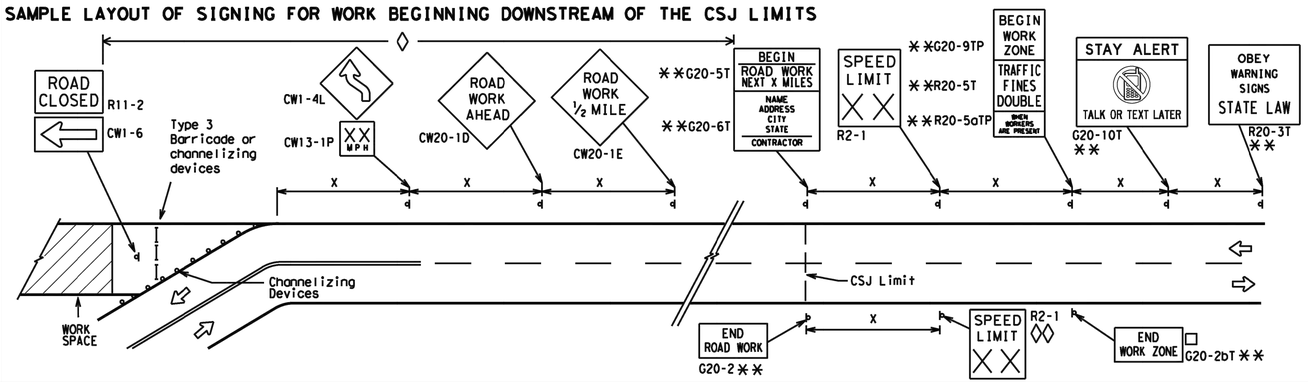
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

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.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ 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 CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ 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.

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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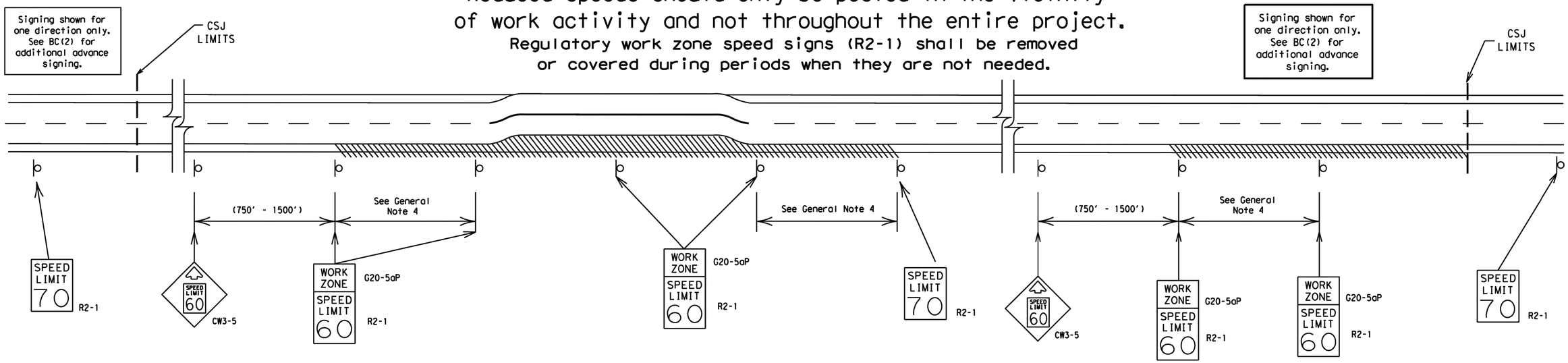
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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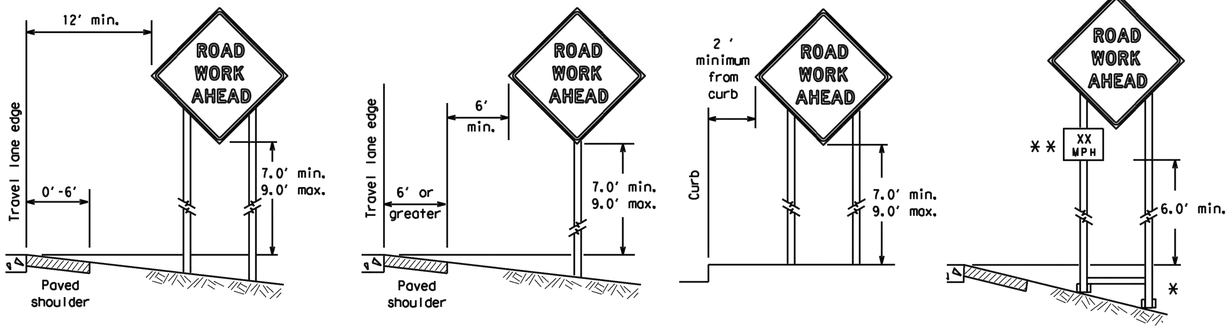
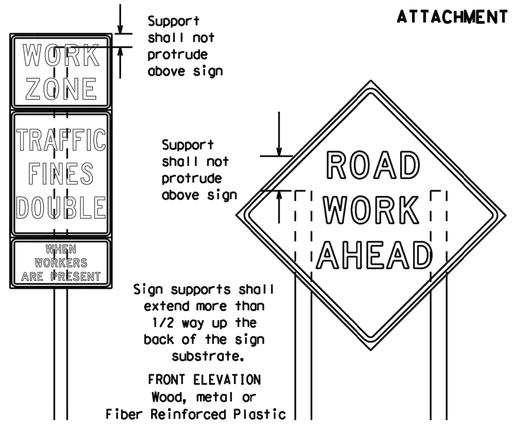
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

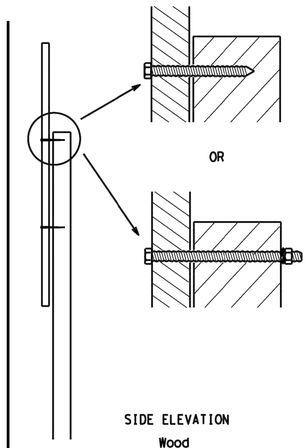


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS





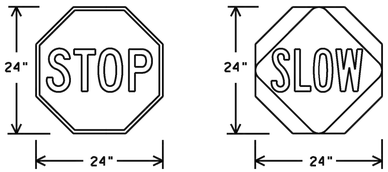
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. 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 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. 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.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
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 shall 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.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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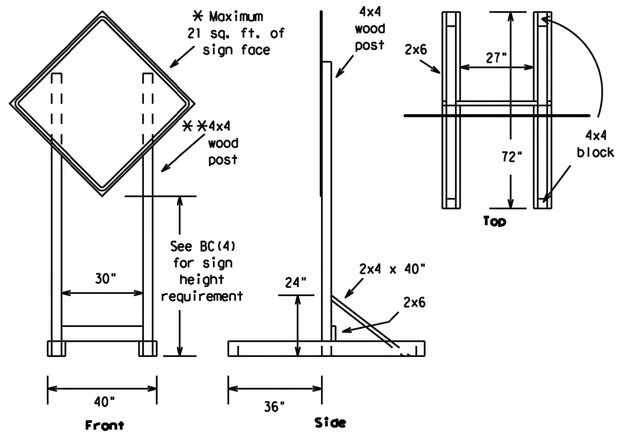
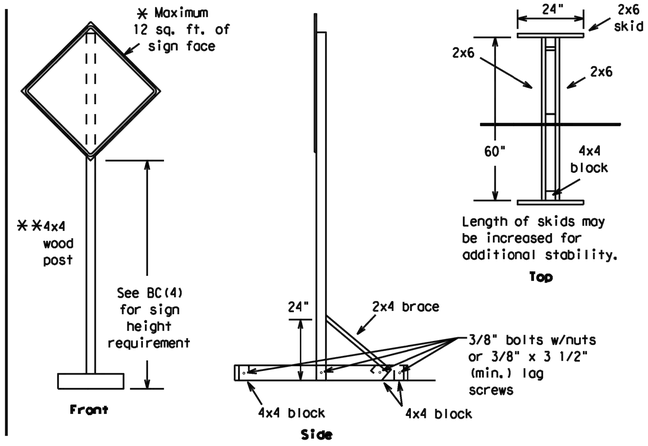
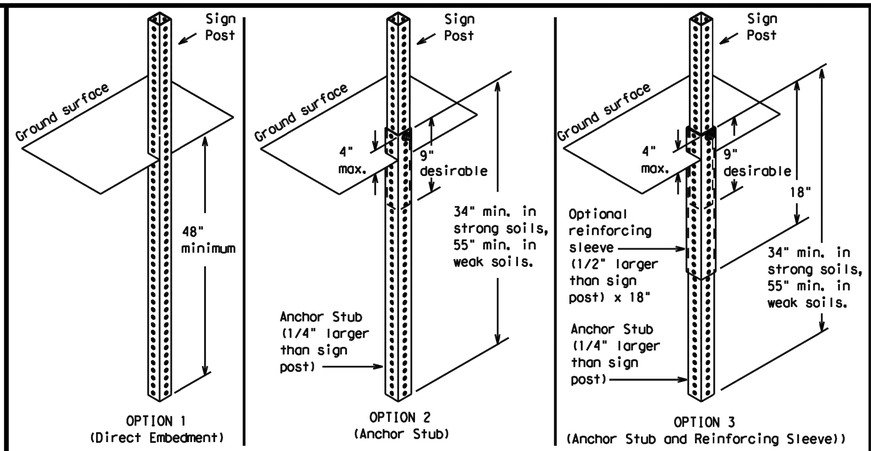




SKID MOUNTED WOOD SIGN SUPPORTS

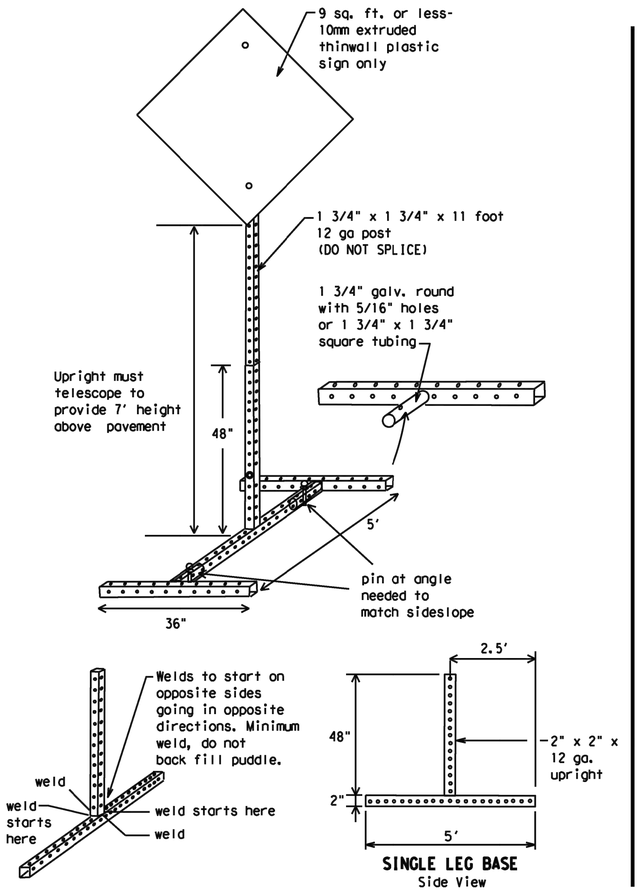
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

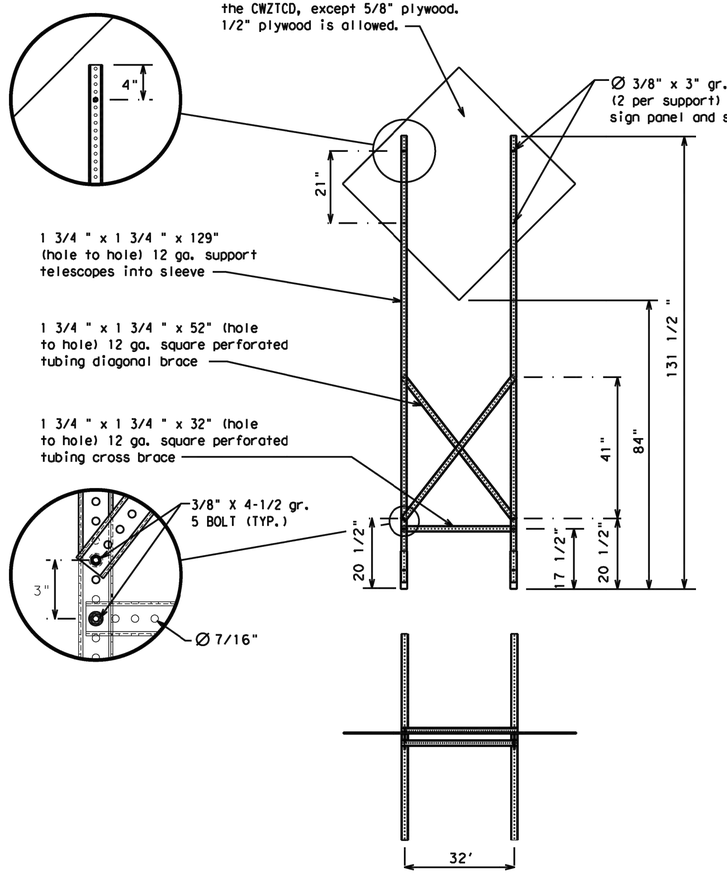


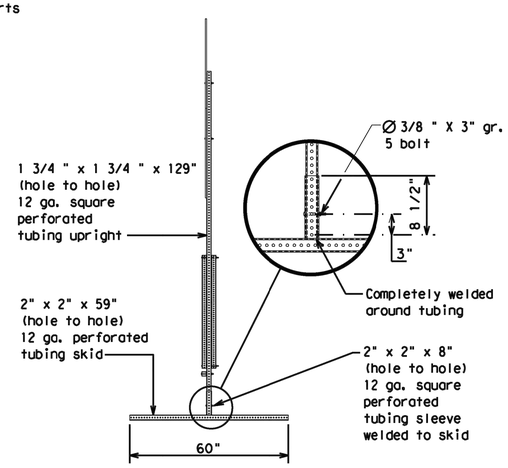
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

WEDGE ANCHORS

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. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

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. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** 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.

SHEET 5 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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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 units. 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
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation * IH-number, US-number, SH-number, FM-number

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

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

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
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT *

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

** Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

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

** 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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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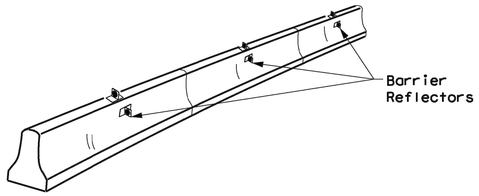
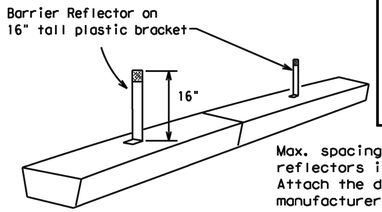
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

3. 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.
4. 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.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

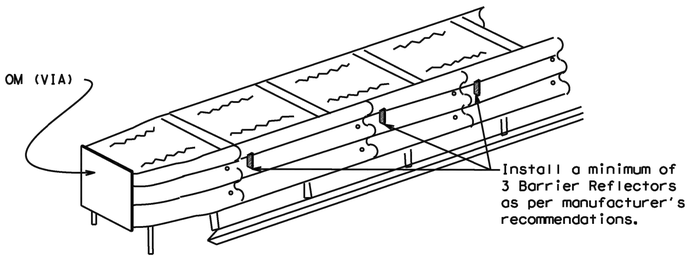


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

LOW PROFILE CONCRETE BARRIER (LPCB)

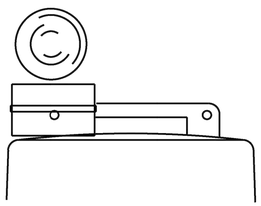


DELINEATION OF END TREATMENTS

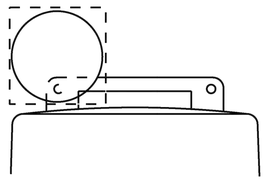
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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

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_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
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 this sheet and/or other 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.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

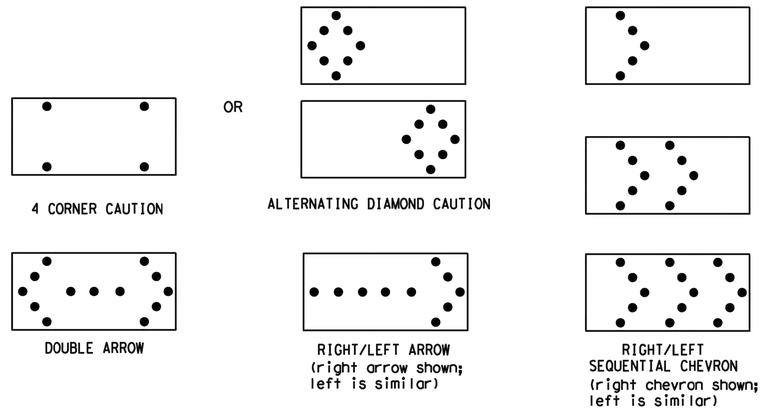
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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.

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 TxDOT 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

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in 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. TMAs are required on freeways unless otherwise noted in the plans.
5. 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.
6. 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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-21

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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, 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 on freeways, 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:

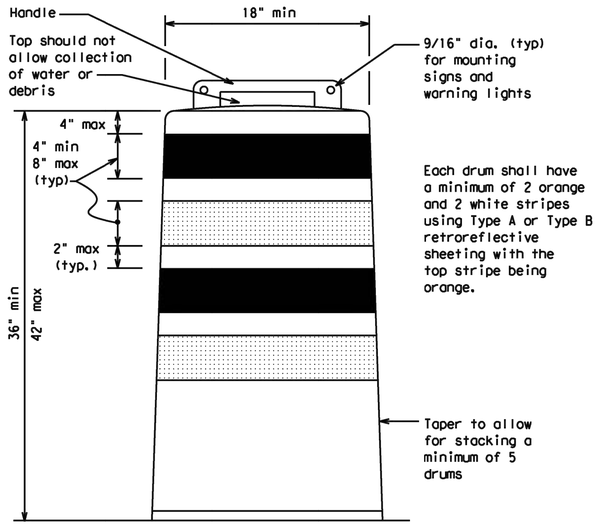
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

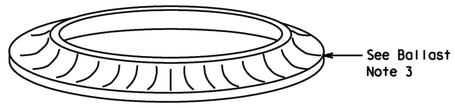
RETROREFLECTIVE SHEETING

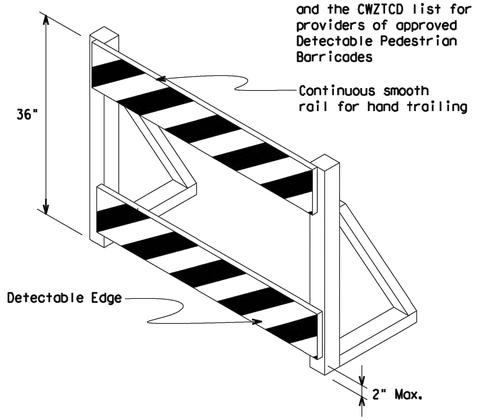
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.



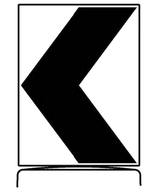




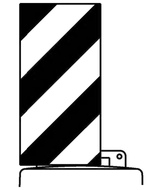
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

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. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
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 (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 should 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.



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_{FL} or Type C_{FL} 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 or Type B. 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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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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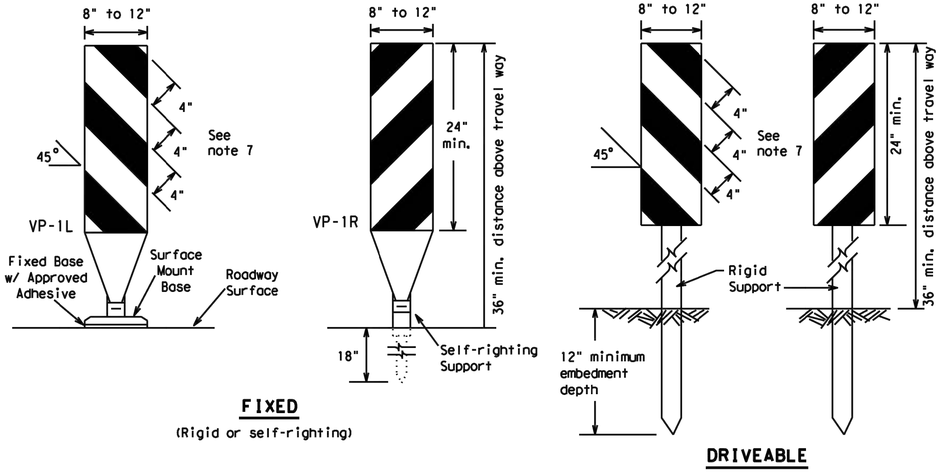
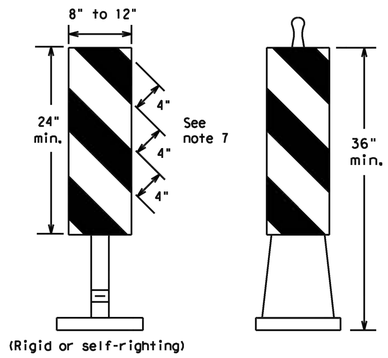


FIXED
(Rigid or self-righting)

DRIVEABLE

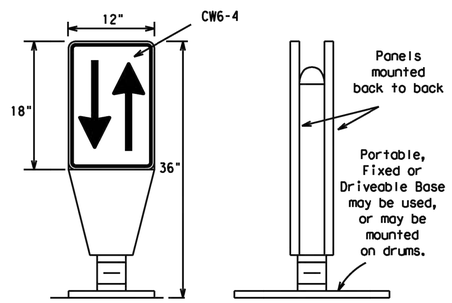


(Rigid or self-righting)

PORTABLE

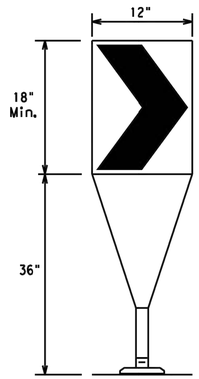
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use 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 or Type B 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.

VERTICAL PANELS (VPs)



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_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



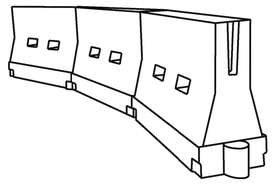
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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_{FL} or Type C_{FL} 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

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.



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). Place reflective sheeting 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 Manual for Assessing Safety Hardware (MASH) 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

Posted Speed	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: 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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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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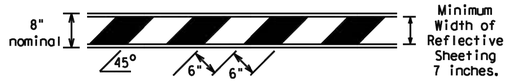
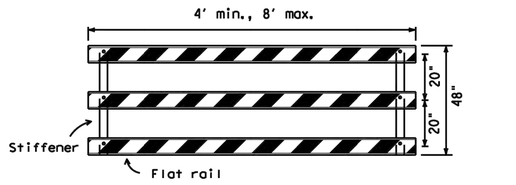
TYPE 3 BARRICADES

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 or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



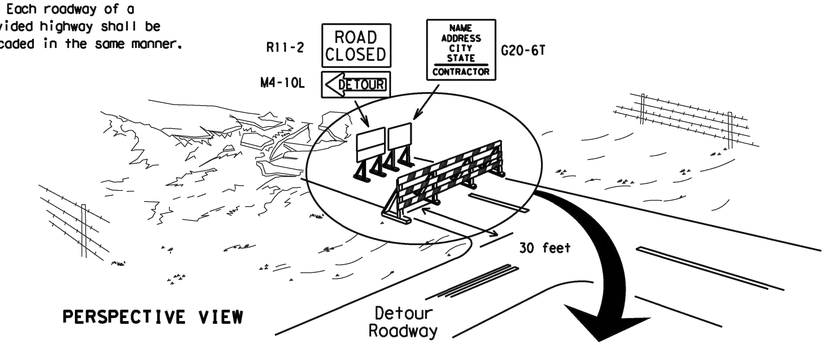
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

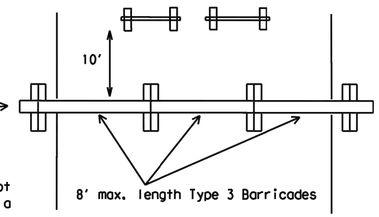
Each roadway of a divided highway shall be barricaded in the same manner.



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.

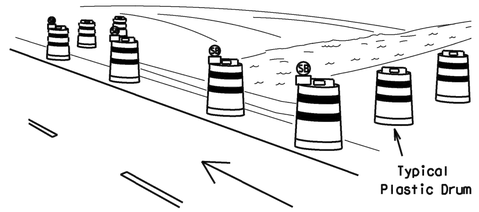
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

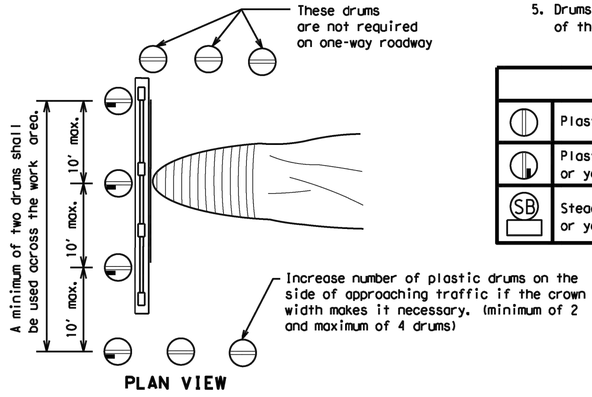
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

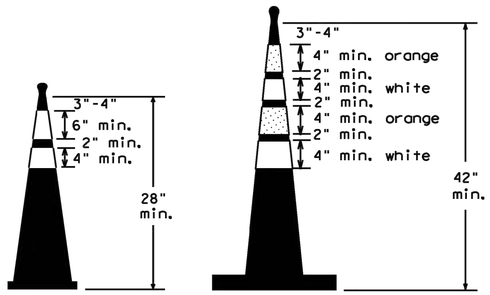
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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.



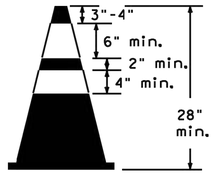
PLAN VIEW

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

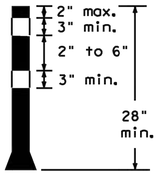
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

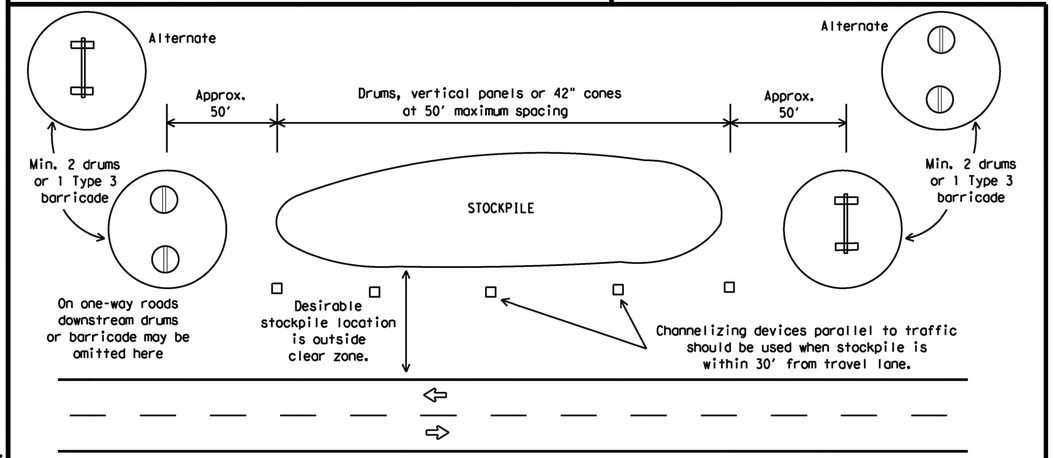


Tubular Marker

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.

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 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 or Type B.
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.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

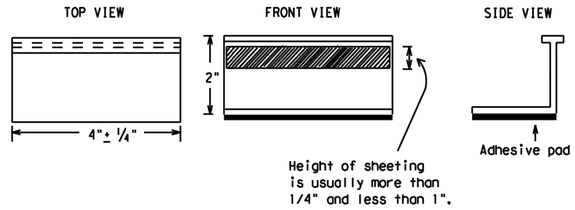
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13				024
11-02 8-14				

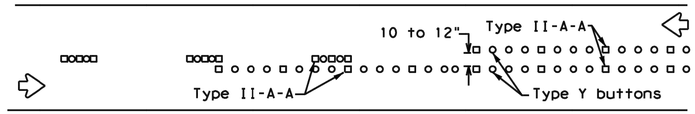
DATE:
FILE:

105

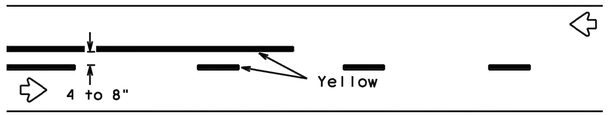
DATE:
FILE:

PAVEMENT MARKING PATTERNS

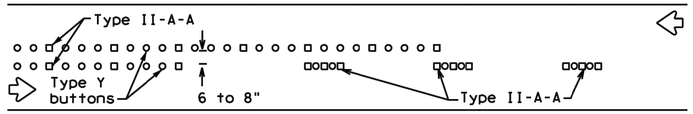
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



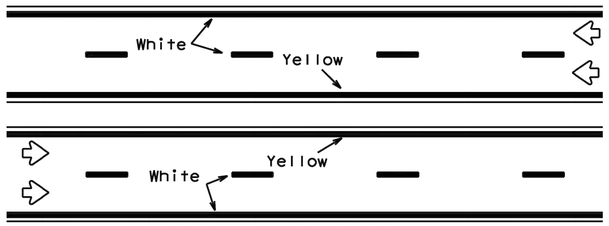
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



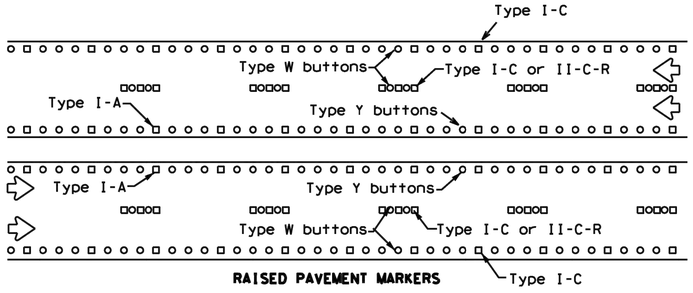
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



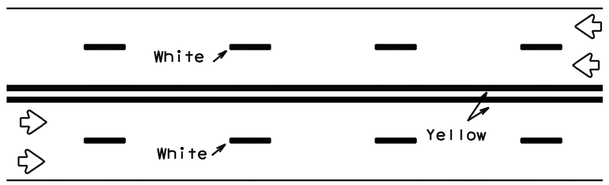
REFLECTORIZED PAVEMENT MARKINGS



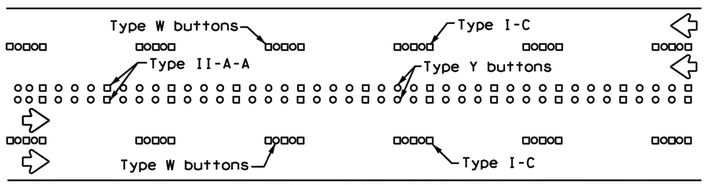
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



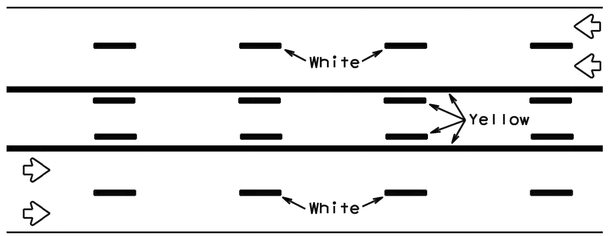
REFLECTORIZED PAVEMENT MARKINGS



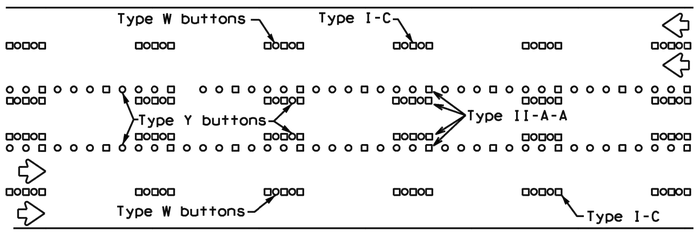
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

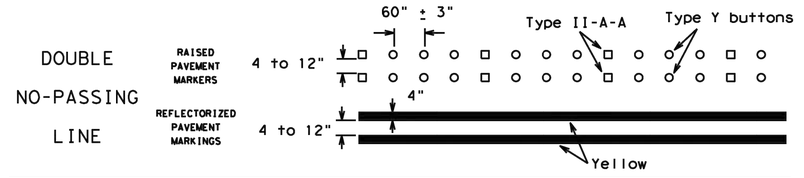
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

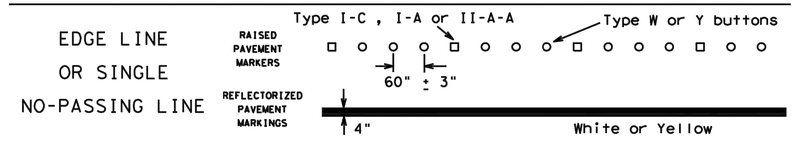
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

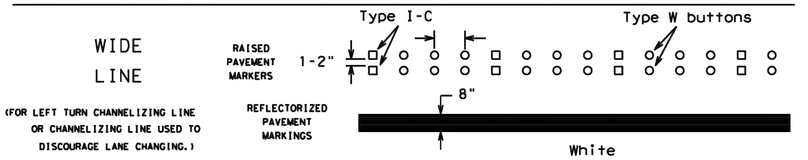


EDGE LINE OR SINGLE NO-PASSING LINE



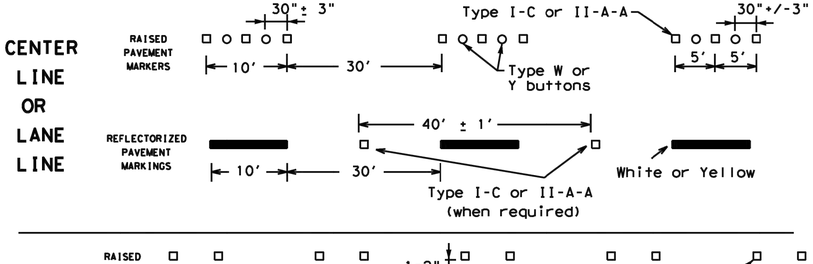
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

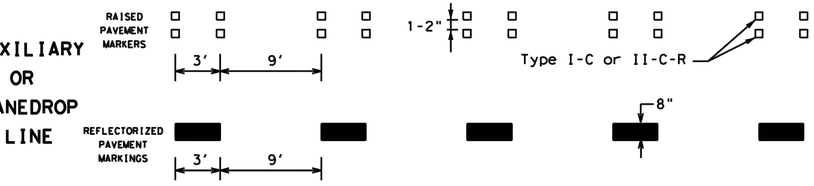


BROKEN LINES

CENTER LINE OR LANE LINE

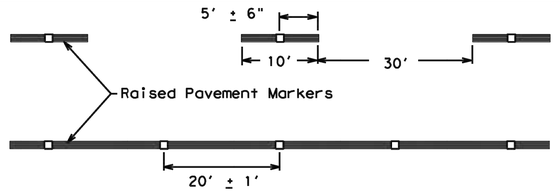


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Safety Division Standard

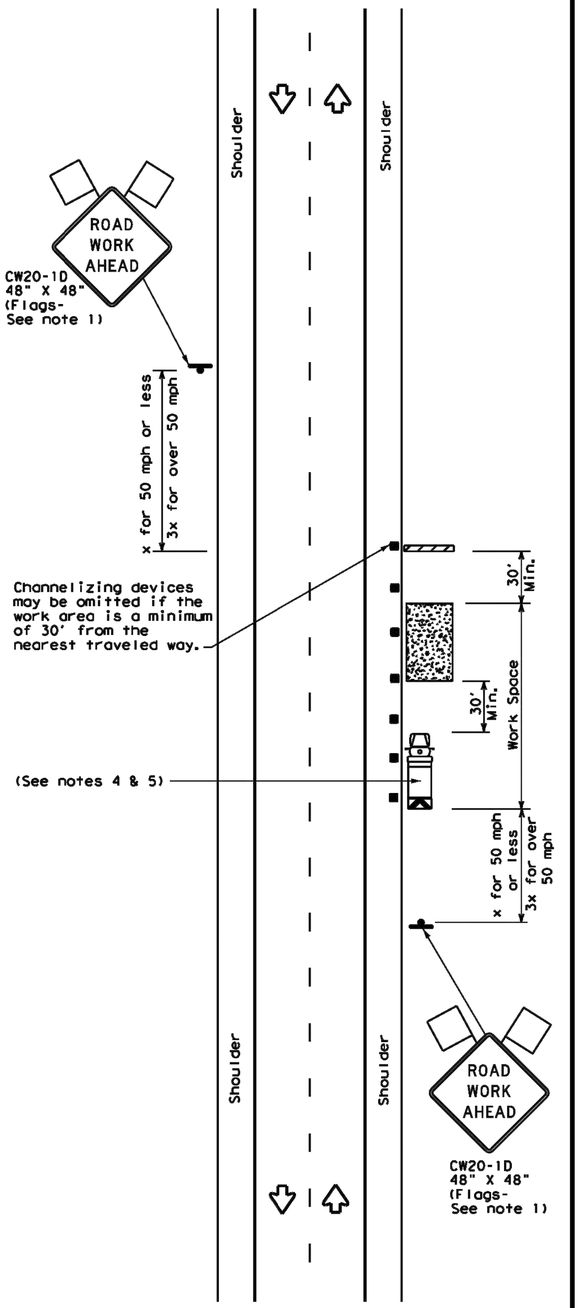
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	DIST	COUNTY		SHEET NO. 025

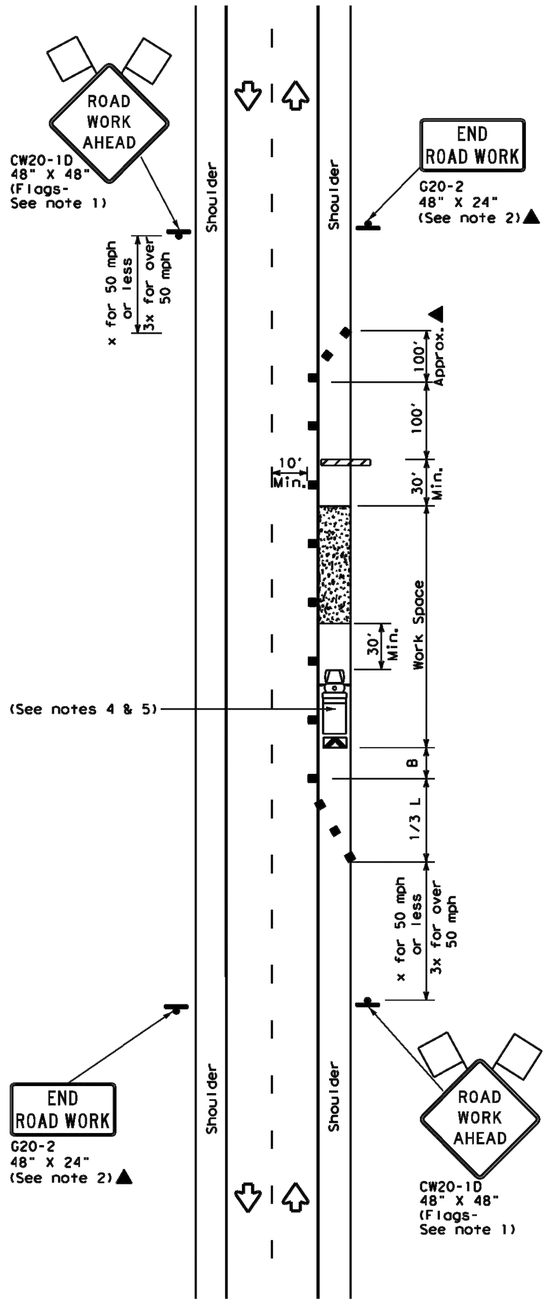
106

DATE:
FILE:



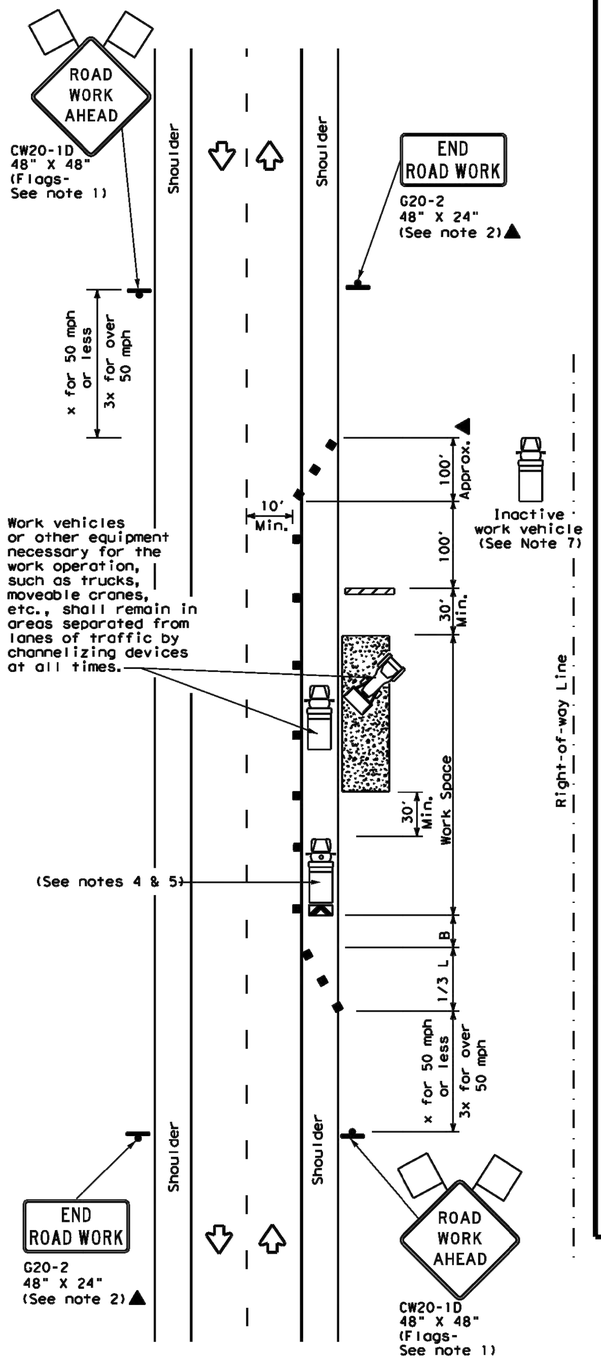
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
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)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

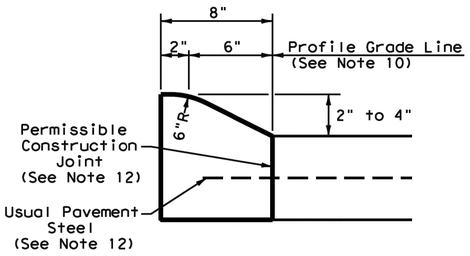
TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

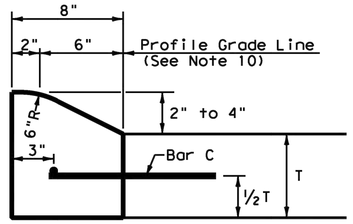
FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12				026
1-97 2-18				

161

DATE:
FILE:



TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



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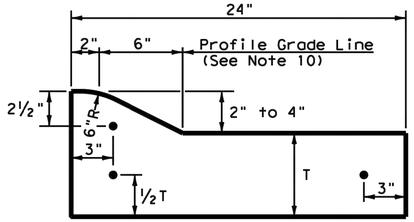
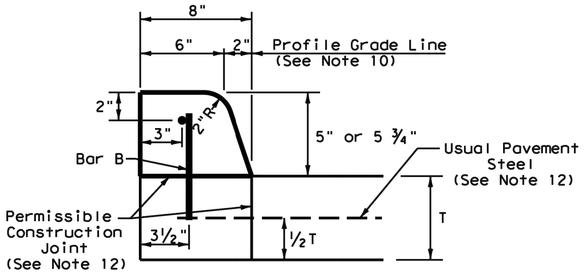
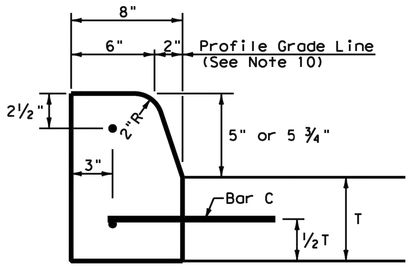


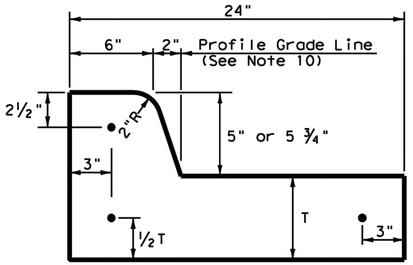
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



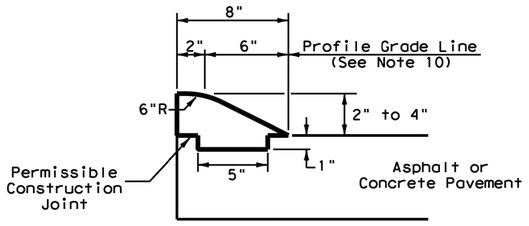
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



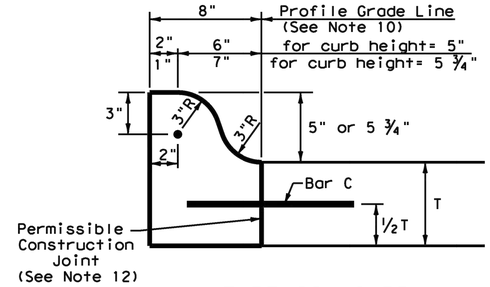
TYPE II CURB
5" - 5 ¾" HEIGHT



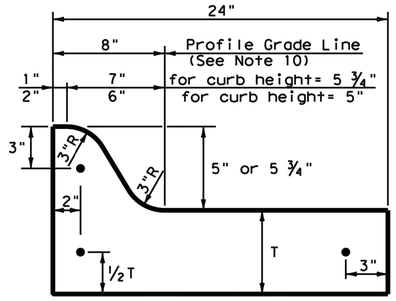
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



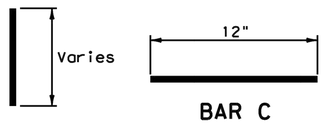
TYPE III CURB (KEYED)
2" - 4" HEIGHT



TYPE IIa CURB
5" - 5 ¾" HEIGHT

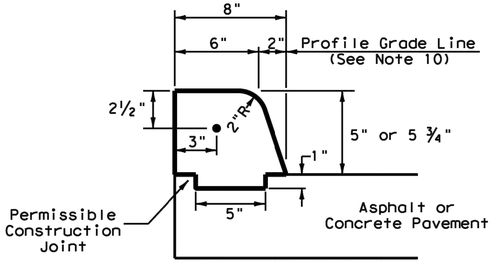


TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT



BAR B

BAR C



TYPE IV CURB (KEYED)
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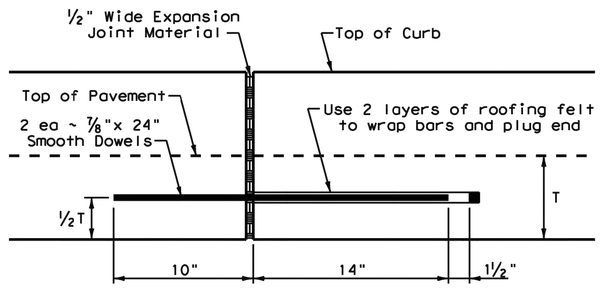
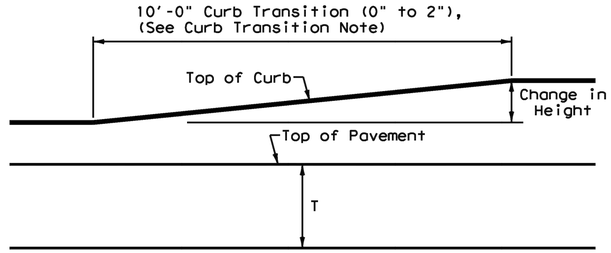


EXPANSION JOINT DETAIL

Curb Transition Note:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

General Notes

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No. 4 unless otherwise shown. The use of synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Producer List (MPL), maintained by TxDOT, Construction Division.
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is placed on existing concrete pavement, the pavement shall be drilled and the reinforcing bars grouted in place.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When vertical permissible construction joints are used, resulting in a longitudinal construction joint in the pavement, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans for longitudinal construction joints. Reinforcing steel for curb section shall then conform to that required for concrete curb.

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-12

FILE: cccg12.dgn	DN: TxDOT	CK: AM	DW: VP	CK: VP	
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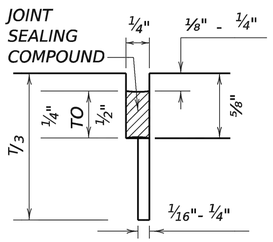
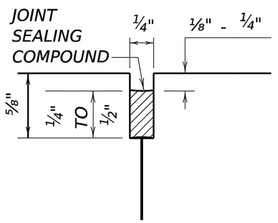
REVISIONS UPDATED 2012 - VP					
	DIST	COUNTY		SHEET NO.	
				028	

DATE:
FILE:

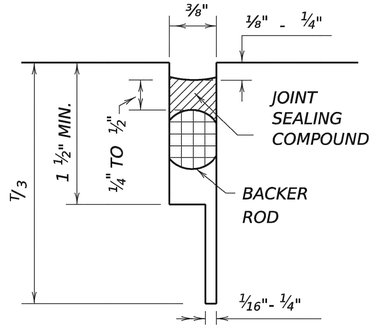
METHOD B: JOINT SEALING COMPOUND



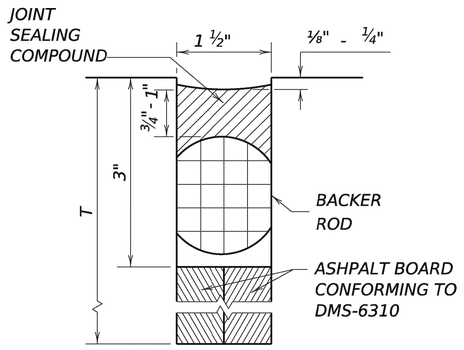
LONGITUDINAL SAWED CONTRACTION JOINT



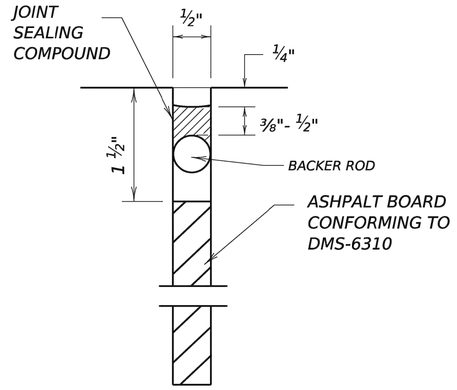
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

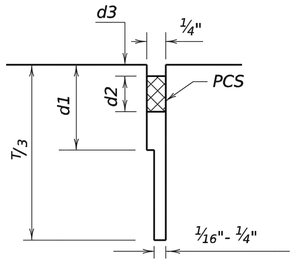


TRANSVERSE FORMED EXPANSION JOINT

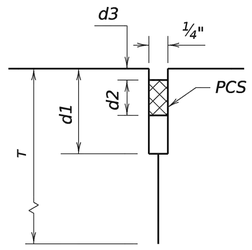


FORMED ISOLATION JOINT

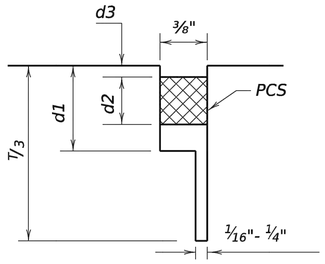
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



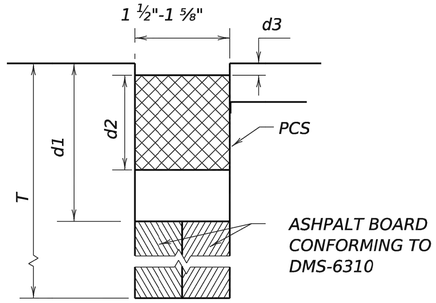
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR SEALANT CLASSIFICATIONS.
6. FOR ALL METHOD "B" JOINTS, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED AT NEW JOINTS.
7. USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTANING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".

Texas Department of Transportation

Design Division Standard

CONCRETE PAVING DETAILS

JOINT SEALS

JS-25

FILE: js25.dgn	DN: TxDOT	DN: AN	DW: AN	CK:
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REVISIONS				
	DIST	COUNTY		SHEET NO.
				029

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U" 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
031	1	R1-5b		36"X36"	✓		S80	1	SA	P	
031	2	R1-5b		36"X36"	✓		S80	1	SA	P	
034	3	R1-1		30"X30"	✓		S80	1	SA	P	
034	4	R4-7b		24"X30"	✓		S80	1	SA	P	

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DATE:
FILE:

03/04/2026
STATE OF TEXAS
BRIAN J. LEE
142043
LICENSED
PROFESSIONAL ENGINEER

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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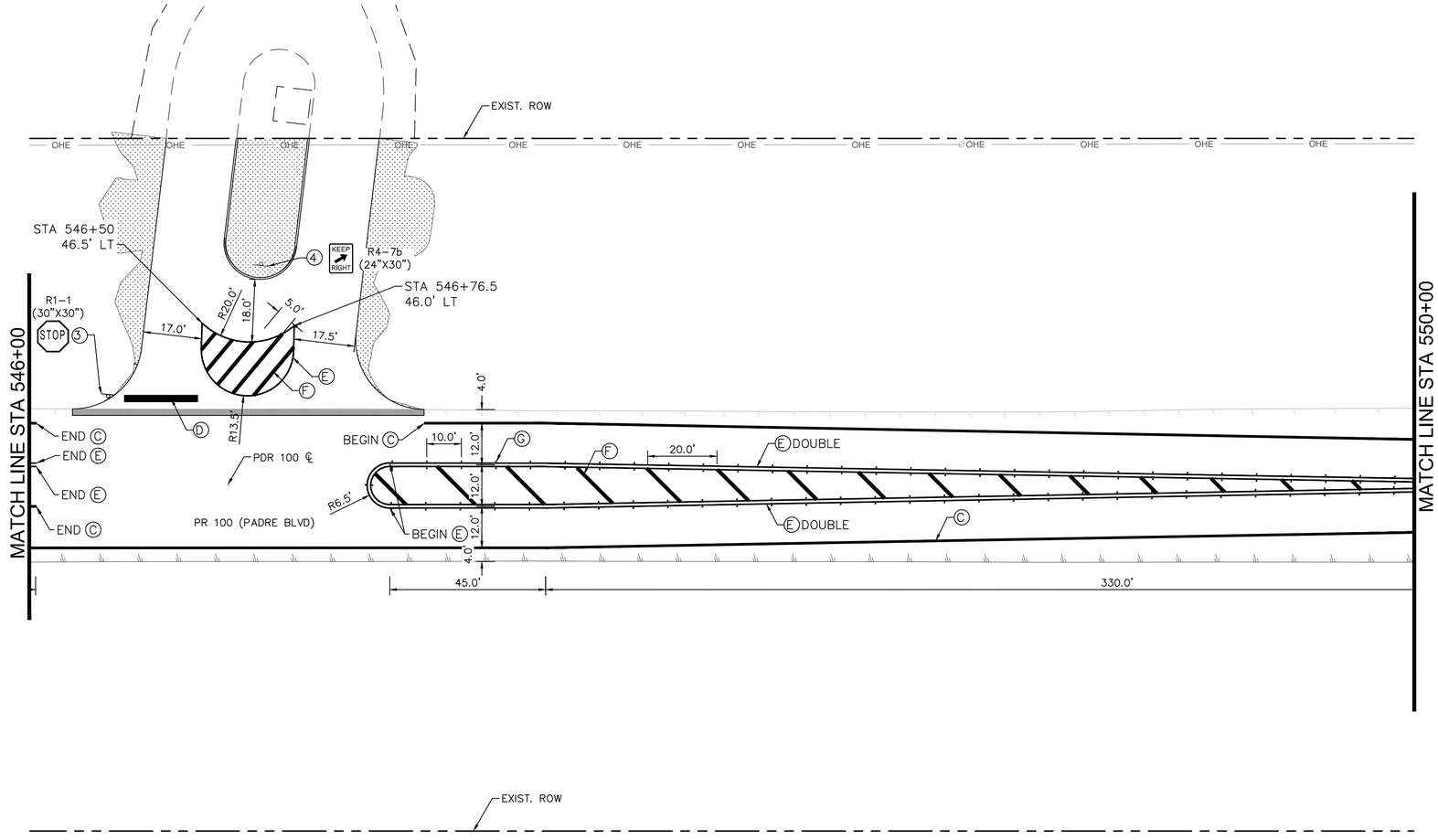
REVISIONS					
4-16		DIST	COUNTY		SHEET NO.
8-16					030

18



GRAPHIC SCALE IN FEET
0 10 20 40

NOTES:

1. EXISTING SMALL SIGNS AND LARGE GUIDE SIGNS TO REMAIN UNLESS OTHERWISE NOTED IN THE SIGNING PLANS.
2. SEE PAVING PLAN AND TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. SIGNS SHALL BE PLACED IN ROW. EDGE OF SIGNS SHALL NOT BE PLACED LESS THAN 2.0' FROM F.O.C. SIGN HEIGHT PLACEMENT SHALL FOLLOW ADA STANDARDS. SIGNS SHALL BE PLACED OUTSIDE OF SIDEWALK WHEN POSSIBLE, AND WHEN NOT POSSIBLE, SHALL BE PLACED IN SUCH A WAY TO MINIMIZE OBSTRUCTION TO PEDESTRIANS.
4. SEE TXDOT DETAILS FOR FURTHER CLARIFICATION TO SIGN PLACEMENT.

MARKING LEGEND

		QTY
(A)	PREFAB PAV MRK TY C (W) (ARROW)	0 EA
(B)	PREFAB PAV MRK TY C (W) (ONLY)	0 EA
(C)	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	688 LF
(D)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	22 LF
(E)	REFL PAV MRK TY I (Y)4"(SLD) (100MIL)	1311 LF
(F)	REFL PAV MRK TY I (Y)12"(SLD) (100MIL)	228 LF
(G)	REFL PAV MRKR TY II-A-A	122 EA
(H)	REFL PAV MRKR TY I-C	0 EA

SIGNING LEGEND

(#) PROPOSED SIGN

○ SMALL ROADSIDE SIGN ASSEMBLY

No.	Revision	By	Date

03/04/2026

STATE OF TEXAS
BRIAN J. LEE
142043
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn

TBPE REGISTERED ENGINEERING FIRM F-928

South Padre ISLAND

Texas Department of Transportation

PR 100 SIDEWALK AND DRIVEWAY IMPROVEMENTS AT WIND & WATER SPORTS

SIGNING AND MARKING LAYOUT

STA 546+00 TO STA 550+00

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6	N/A	PR 100

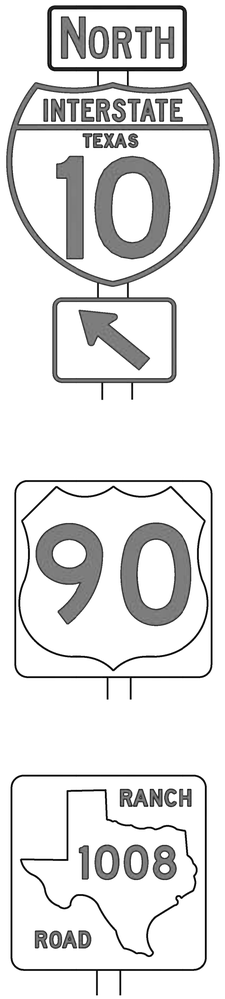
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	PHR	CAMERON	034
CONTROL	SECTION	JOB	
N/A	N/A	N/A	

DATE: 3/4/2026 12:45 PM BY: ANDREW.CASHMAN
FILE: K:\LAC_TPTO\PROJECT\069234003_SPI_PADRE_BLVD_MEDIANS\WINDSPORTS\CADD\PLANSHEETS\SIGNING&MARKING.DWG

DATE:
FILE:

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

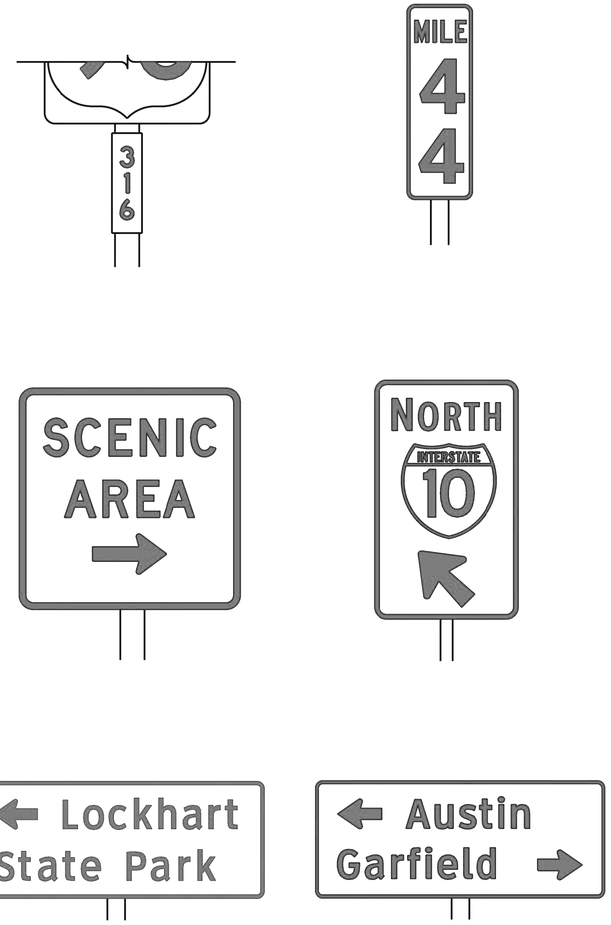
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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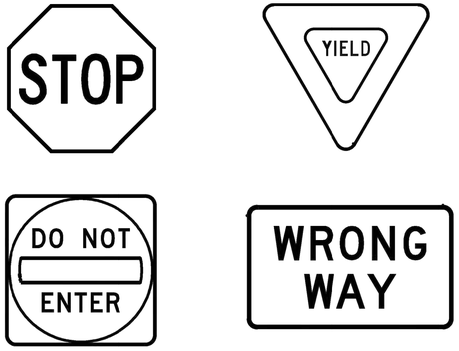
REVISIONS				
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08				036

3

DATE:
FILE:

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

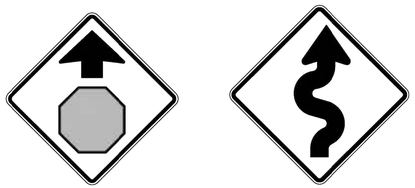
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

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12-03 7-13	DIST	COUNTY		SHEET NO.
9-08				037

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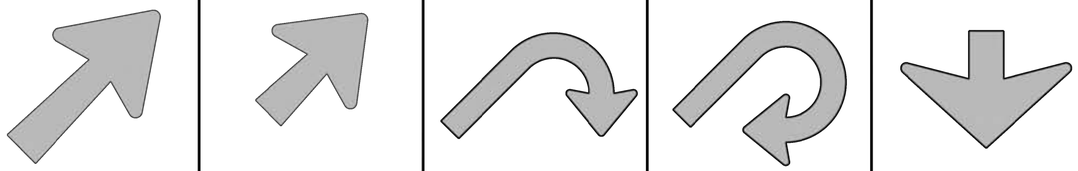
ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

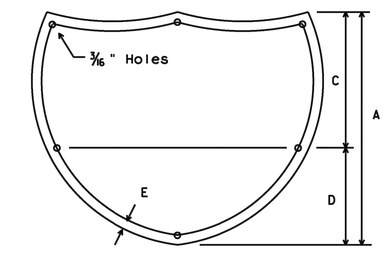
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

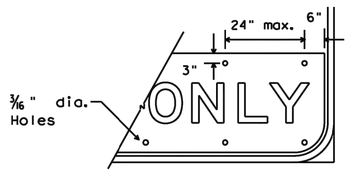
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

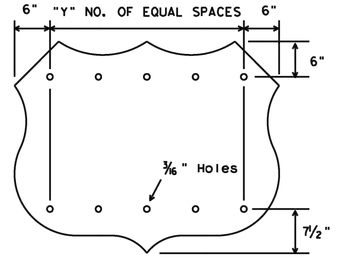


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

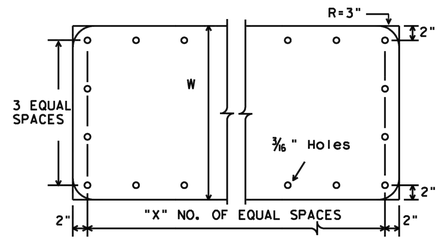


EXIT ONLY PANEL



U.S. ROUTE MARKERS

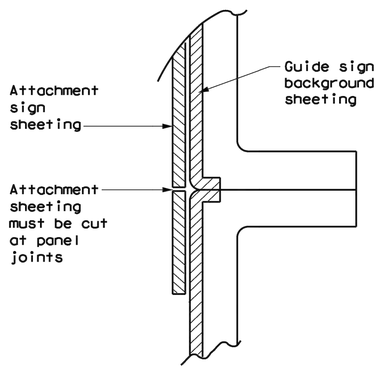
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

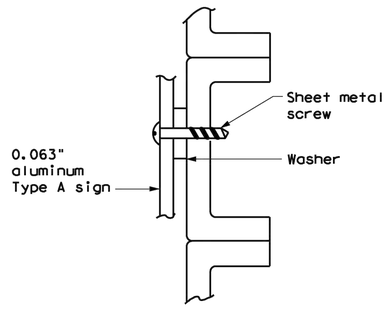
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



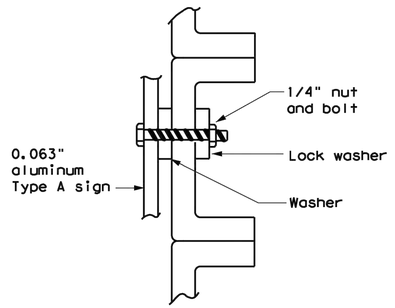
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



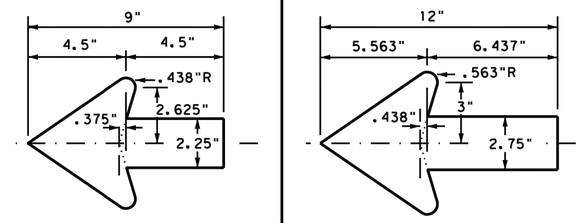
NUT/BOLT ATTACHMENT

NOTE:

Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.

Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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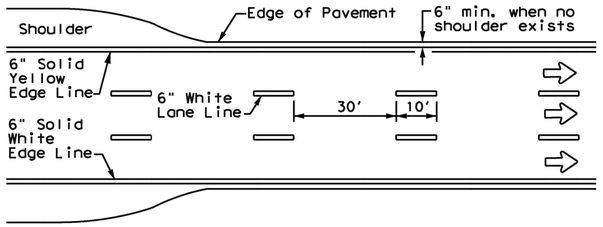
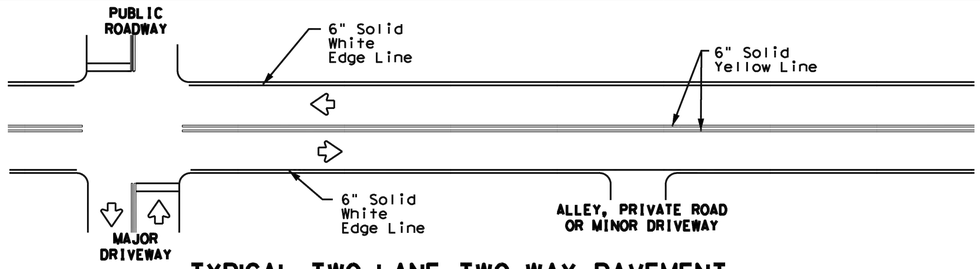
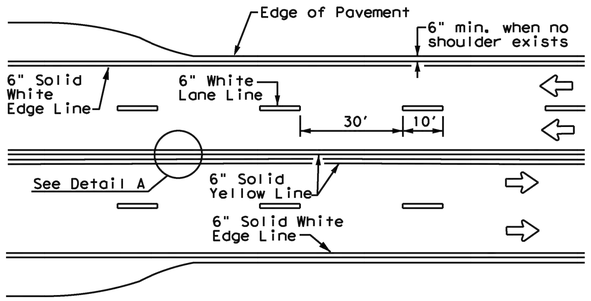
REVISIONS				
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08				038

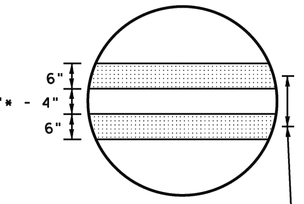


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

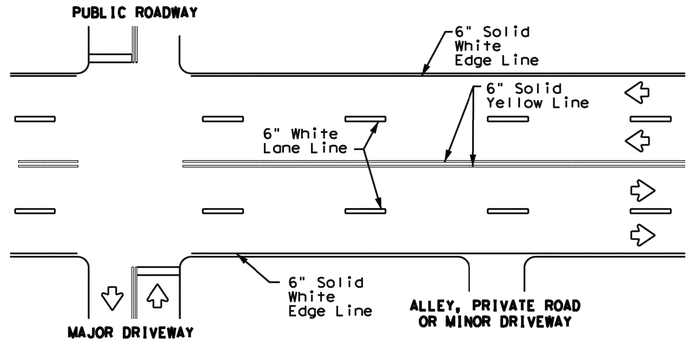




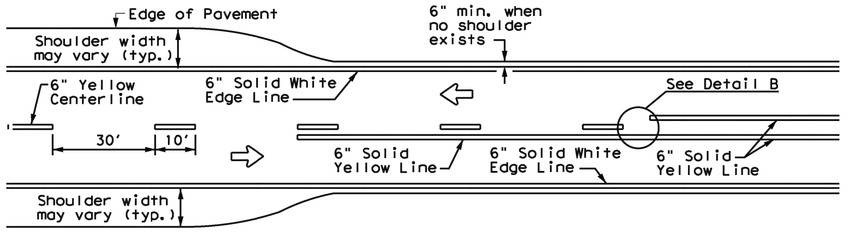
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

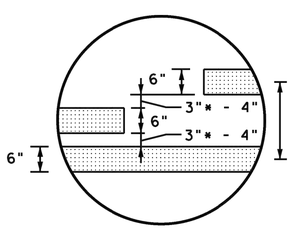
** 8" minimum for restripe projects when approved by the Engineer.



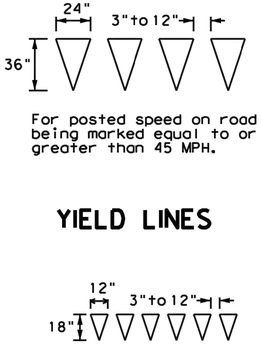
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

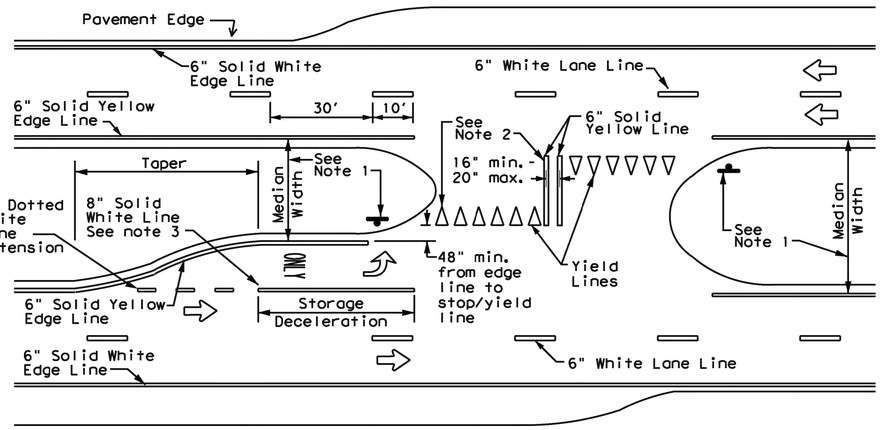


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

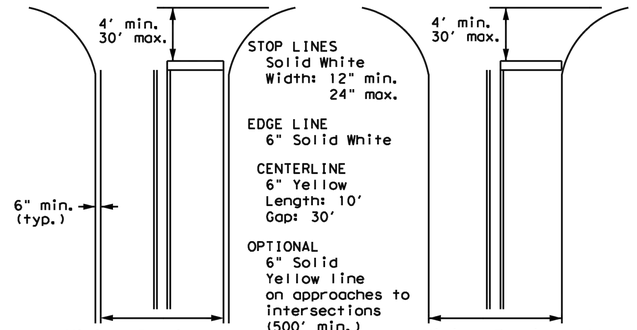
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
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REVISIONS 11-78 8-00 6-20 / 8-95 3-03 12-22 / 5-00 2-12	DIST	COUNTY		SHEET NO. 039

22A

DATE:
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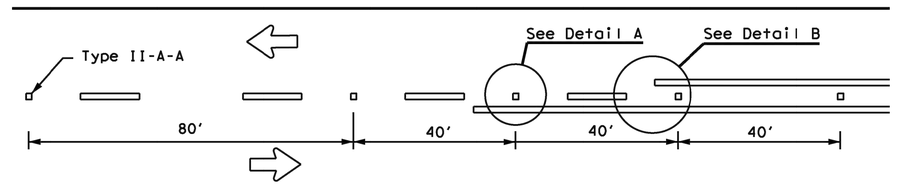
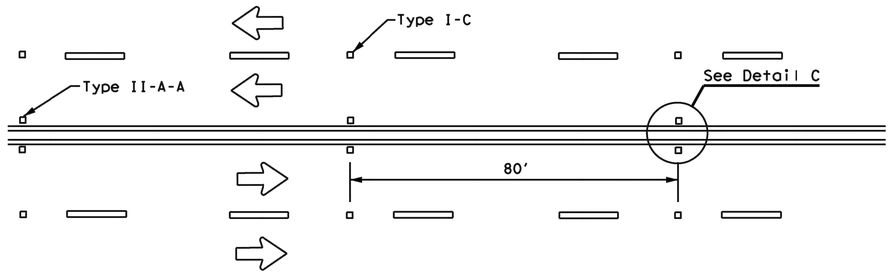
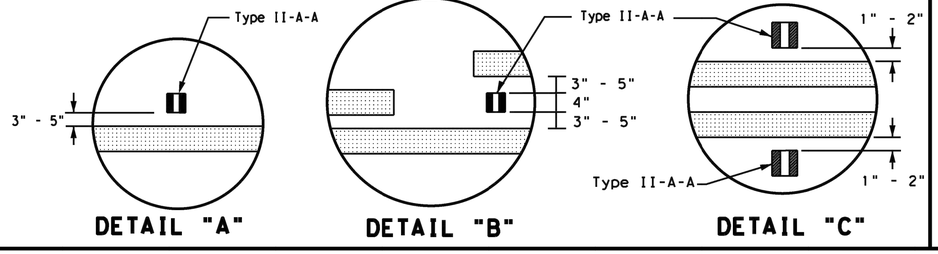
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

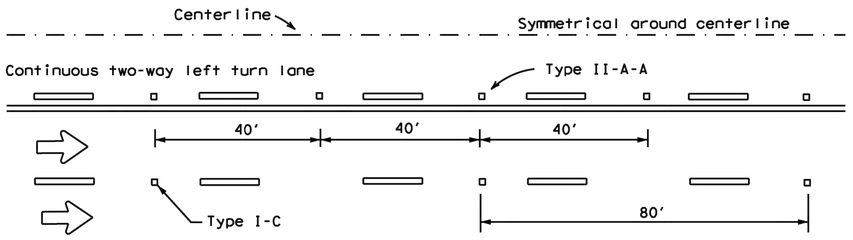


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

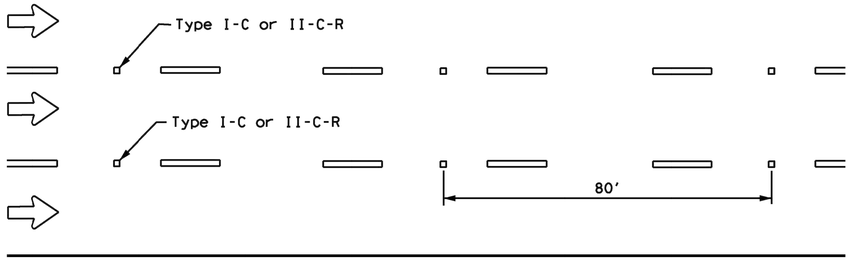


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



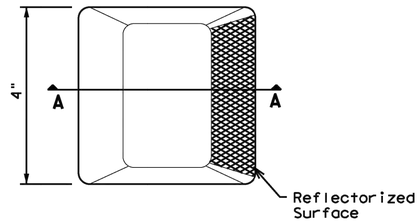
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

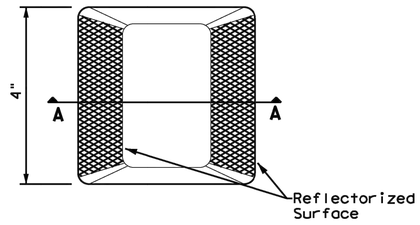
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

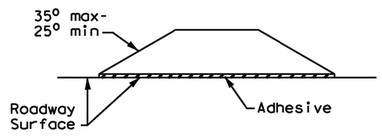
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

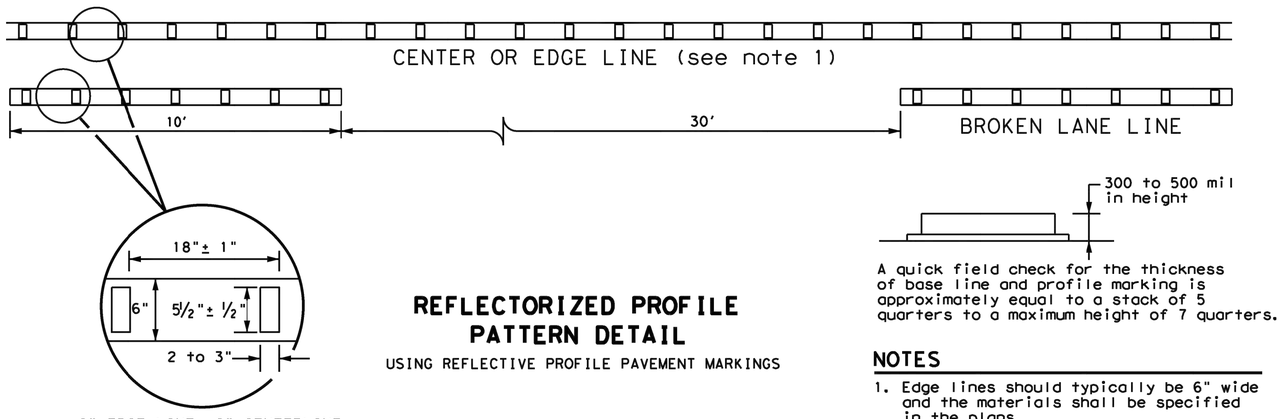


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements, the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians, and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
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228

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