### **VOLUME I**

### **CITY OF HOUSTON** LAKE HOUSTON REDEVELOPMENT AUTHORITY TAX INCREMENT REINVESTMENT ZONE NUMBER TEN

### NORTHPARK DRIVE **OVERPASS PROJECT (T-1013)**



LOCATION MAP





KEY MAP NO 296S, 296T, 296U





DISTRICT I

TIFFANY D. THOMAS

DISTRICT F

DAVE MARTIN

DISTRICT E

DISTRICT

ROBERT GALLEGOS EDWARD POLLARD MARTHA CASTEX-TATUM

DISTRICT J

DISTRICT C

GREG TRAVIS

DISTRICT G

BOARD MEMBERS CHAIRMAN STANLEY SARMAN VICE CHAIR PHILIP IVY TREASURER TOM BROAD

LHRA

MAYOR

SYLVESTER TURNER

CONTROLLER

CHRIS BROWN

DISTRICT D

KARLA CISNEROS

DISTRICT H

ABBIE KAMIN CAROLYN EVANS-SHABAZZ

DISTRICT K

NCIL	MEMBERS	
<u>AT-LA</u>	ARGE	
	DAVID W. ROBINSON POSITION 2	
DSH S	LETITIA PLUMMER POSITION 4	
SALLIE POSIT	ALCORN ION 5	

DIRECTOR DR. MARTIN BASALDUA DIRECTOR NOLAN CORREA

COUNCIL

MIKE KNOX

POSITION 1

MICHAEL KUBOSH

POSITION 3

NO

FUNCTIONAL CLASSIFICATION MAINLANES: URBAN ARTERIAL FRONTAGE ROADS: MAJOR COLLECTORS CROSS STREETS: URBAN ARTERIAL

SIGN SPEED NORTHPARK DRIVE = 45 MPH LOOP 494 = 45 MPHFRONTAGE ROAD = 40 MPH -TURN = 15 MPH

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	NORTHPARK
ML	51,628 (2025) 53,397 (2035) 55,226 (2045)

PROPOSED DESIGN STANDARDS (ROADWAY): TXDOT ROADWAY DESIGN MANUAL 2020 CHAPTER 3: 4R. SECTION2: URBAN STREETS

PROPOSED DESIGN STANDARDS (TRAFFIC): TMUTCD & APPLICABLE TRAFFIC STANDARDS

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#### <u>VOLUME I</u>

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RETAINING WALL STANDARDS, SELECTED BY PAULA INPATT, P.E., HNTB CORPORATION

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THPARK DR

	PERMANENT TRAFFIC SIGNAL STANDARDS, SELECTED BY ROBERTSON JON P. BELARMINO, P.E., HNTB CORPORATION						
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501	POLE FOUNDATION DETAILS ***						
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502A	PULL BOXES COH STANDARDS						
503-505	LOOP DETECTOR INSTALLATION DETAILS ***						
507	LOUF DEILLIUK INSTALLATION DETAILS ### OVERHEAD STREET NAME SIGN MOUNTING DETAILS ###						
508	METER LOOP ***						
508A	GENERAL NOTES AND GROUND MOUNTING SIGN COH STANDARDS						
508B	STREET NAME SIGN AND SIGN MOUNTING COH STANDARDS						
508L 508D	GROUND MOUNTED STON STZES CON STANDARDS TYPICAL STON PLACEMENT CON STANDARDS						
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712	EQUALIZER PIPE LAYOUT
713	PLAN AND PROFILE 60" RCP EQUALIZER PIPE
714	PLAN AND PROFILE 48" RCP INFLOW AND OUTFLOW PIPE

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#### <u>LEGEND</u>

(A)	7" REINF CONCRETE PAVMENT
B	1 1/2" ASPHALT PAVEMENT
C	7" CEMENT TREATED BASE
D	6" CEMENT TREATED SUBGRADE
E	5" REINF CONCRETE SIDEWALK
F	6" MONO CURB
	EXIST TRAVEL LANE
EBML	= EASTBOUND MAIN LANES
WBML	= WESTBOUND MAIN LANES









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#### LEGEND

(A)		7" REINF CONCRETE PAVMENT
B		1 1/2" ASPHALT PAVEMENT
C		7" CEMENT TREATED BASE
D		6" CEMENT TREATED SUBGRADE
E		5" REINF CONCRETE SIDEWALK
F		6" MONO CURB
		EXIST TRAVEL LANE
EBML	=	EASTBOUND MAIN LANES
WBML	=	WESTBOUND MAIN LANES











#### LEGEND

- A 7" REINF CONCRETE PAVMENT
   B 1 <sup>1</sup>/<sub>2</sub>" ASPHALT PAVEMENT
   C 7" CEMENT TREATED BASE
   D 6" CEMENT TREATED SUBGRADE
   E 5" REINF CONCRETE SIDEWALK
   F 6" MONO CURB
   EXIST TRAVEL LANE
   EBML = EASTBOUND MAIN LANES
- WBML = WESTBOUND MAIN LANES



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B		1 1/2" ASPHALT PAVEMENT
©		7" CEMENT TREATED BASE
D		6" CEMENT TREATED SUBGRADE
E		5" REINF CONCRETE SIDEWALK
F		6" MONO CURB
$\Leftrightarrow$		EXIST TRAVEL LANE
EBML	=	EASTBOUND MAIN LANES
WBML	-	WESTBOUND MAIN LANES



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B		1 1/2" ASPHALT PAVEMENT
C		7" CEMENT TREATED BASE
D		6" CEMENT TREATED SUBGRADE
E		5" REINF CONCRETE SIDEWALK
F		6" MONO CURB
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B		1 1/2" ASPHALT PAVEMENT
C		7" CEMENT TREATED BASE
D		6" CEMENT TREATED SUBGRADE
E		5" REINF CONCRETE SIDEWALK
F		6" MONO CURB
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D		6" CEMENT TREATED SUBGRADE
E		5" REINF CONCRETE SIDEWALK
F		6" MONO CURB
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WBML	=	WESTBOUND MAIN LANES



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 SEE ROADWAY PLAN PROFILE SHEET FOR PAVEMENT TRANSITIONS.

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(A)	12" REINF CONCRETE PAVMENT
B	1" ASPHALT STAB BASE (GR 4) (PG 64)
C	6" CEMENT TREATED BASE
D	8" LIME TREATED BASE
E	5" REINF CONCRETE SIDE PATH
F	12" MONO CURB
G	BLOCK SODDING
Э	MOW STRIP
	42" BARRIER (SSCB)
J	36" RAIL (TY SSTR)
ĸ	CONCRETE RIP RAP
L	TEMPORARY PAVEMENT
M	MSE RETAINING WALL
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SBML =	SOUTHBOUND MAIN LANES











SEE BRIDGE LAYOUT SHEETS FOR BRIDGE TYPICAL SECTIONS AND LIMITS.
 SEE ROADWAY PLAN PROFILE SHEET FOR PAVEMENT TRANSITIONS.

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C		6" CEMENT TREATED BASE
D		8" LIME TREATED BASE
E		5" REINF CONCRETE SIDE PATH
F		12" MONO CURB
G		BLOCK SODDING
Э		MOW STRIP
1		42" BARRIER (SSCB)
J		36" RAIL (TY SSTR)
К		CONCRETE RIP RAP
L		TEMPORARY PAVEMENT
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#### LEGEND

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\*\*\* PROP 1-6'X4' RCB FROM STA 413+36.12 TO STA 415+45.08 \*\*\*\* EXIST 1-72" RCP FROM STA 413+36.12 TO STA 415+45.08

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SEE BRIDGE LAYOUT SHEETS FOR BRIDGE TYPICAL SECTIONS AND LIMITS.
 SEE ROADWAY PLAN PROFILE SHEET FOR PAVEMENT TRANSITIONS.

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Sheet A

County: Montgomery

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

General Notes:

General:

Contractor questions on this project are to be addressed to the following individual(s):

Vince Obregon, PE (vobregon@HNTB.com) Paula Ikpatt, PE (pikpatt@HNTB.com) Joel Salinas, PE (jsalinas@HNTB.com)

Contractor questions will be accepted through email, phone, and in person by the above individuals.

Notify the Engineer immediately if discrepancies are discovered in the horizontal control or the benchmark data.

The following standard detail sheets are modified:

#### Modified Standards

- CONCRETE CURB AND CURB AND GUTTER CCCG-12 (MOD)
- BRIDGE DECK DRAIN DETAILS (BD-2) (MOD)
- MISCELLANEOUS SLAB DETAILS (IGMS) (MOD)
- THICKENED SLAB END DETAILS (IGTS) (MOD)
- PRESTRESSED CONCRETE PANELS (PCP) (MOD)

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved, except for roadway illumination, electrical, and traffic signal items.

The cost for materials, labor, and incidentals to provide for traffic across the roadway and for ingress and egress to private property in accordance with Section 7.2.4 of the TxDOT standard specifications is subsidiary to the various bid items. Restore access roadways to their original condition upon completing construction.

Grade street intersections and median openings for surface drainage.

Stencil the National Bridge Inventory (NBI) number on each new bridge shown on these plans. The NBI number is shown above the title block for each bridge layout.

General Notes

Sheet A

County: Montgomery

**Control:** CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Clearly mark or highlight on the shop drawings, the items being furnished for this project. Submit required shop drawings in accordance with the shop drawing distribution list shown in the note for Item 5 for review and distribution.

Unless otherwise shown on the plans or otherwise directed, commence work after sunrise and ensure construction equipment is off the road by sunset.

Procure permits and licenses, which are to be issued by the City, County, or Municipal Utility District.

Any groundwater elevation information provided is representative of conditions existing on the day when and for the specific location where this information was collected. The actual groundwater elevation may fluctuate with time, climatic conditions, and construction activity.

#### General: Roadway Illumination and Electrical

For roadway illumination and electrical items, use materials from pre-qualified producers as shown on the Construction Division (CST) of TxDOT's material producers list. Check the latest link on TxDOT's website for this list. The category/item is "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials found on this list.

Perform electrical work in conformance with the National Electrical Code (NEC) and the Department's standard sheets.

The Contractor may make the electrical grounding connections and permissible splices using the thermal fusion process, Cadweld, ThermOweld, or approved equal, instead of bolted connections and splices.

The Engineer will arrange with the Contractor, an inspection of the completed electrical systems for the highway lighting systems before final acceptance for compliance with plans and specifications. The inspection will be made with personnel from the electrical section of the TxDOT's District Transportation Operations Office. The city's electrical division personnel will also inspect lighting systems within the city limits. Portions of the work found to be deficient during this inspection will not be accepted.

#### General: Traffic Signals

For traffic signal items, use materials from the Pre-Qualified Producers List (located at http://www.dot.state.tx.us/GSD/purchasing/supps.htm) and the materials pre-qualified for illumination and electrical items (located at http://ftp.dot.state.tx.us/pub/txdotinfo/cmd/mpl/riaes.pdf) as shown on TxDOT's Material Producers List and the Roadway Illumination and Electrical Supplies List. Check the latest links on TxDOT's website for these lists. No substitutions will be allowed for materials found on these lists.

General Notes

#### Sheet B

Sheet B



Sheet C

County: Montgomery

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

#### General: Site Management

Mark stations every 100 ft. and maintain the markings for the project duration. Remove the station markings at the completion of the project. This work is subsidiary to the various bid items.

Do not mix or store materials, or store or repair equipment, on top of concrete pavement or bridge decks unless authorized by the Engineer. Permission will be granted to store materials on surfaces if no damage or discoloration will result.

Personal vehicles of employees are not permitted to park within the right of way, including sections closed to public traffic. Employees may park on the right of way at the Contractor's office, equipment, and materials storage yard sites.

Assume ownership of debris and dispose of at an approved location. Do not dispose of debris on private property unless approved in writing by the Engineer.

Control the dust caused by construction operations. For sweeping the base material in preparation for laying asphalt and for sweeping the finished concrete pavement, use one of the following types of sweepers or approved equal:

Tricycle Type	Truck Type - 4 Wheel
Wayne Series 900	M-B Cruiser II
Elgin White Wing	Wayne Model 945
Elgin Pelican	Mobile TE-3
_	Mobile TE-4
	Murphy 4042

#### General: Traffic Control and Construction

Schedule construction operations such that preparing individual items of work follows in close sequence to constructing storm drains in order to provide as little inconvenience as practical to the businesses and residents along the project.

Schedule work so that the base placement operations follow the subgrade work as closely as practical to reduce the hazard to the traveling public and to prevent undue delay caused by wet weather.

If fences cross construction easements shown on the plans and work is required beyond the fences, remove and replace the fences as directed. This work and the materials are subsidiary to the various bid items.

General Notes

Sheet C

County: Montgomery

**Control:** CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

#### General: Utilities

Consider the locations of underground utilities depicted in the plans as approximate and employ responsible care to avoid damaging utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities.

If the Contractor damages or causes damage (breaks, leaks, nicks, dents, gouges, etc.) to the utility, contact the utility facility owner or operator immediately.

Notify the Engineer at least 48 hours before constructing junction boxes at storm drain and utility intersections.

Install or remove poles and luminaires located near overhead or underground electrical lines using established industry and utility safety practices. Consult the appropriate utility company before beginning such work.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Costs associated with de-energizing the power lines or other protective measures required are at no expense to Lake Houston Redevelopment Authority (LHRA).

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Perform electrical work in conformance with the National Electrical Code (NEC) and Department's standard sheets.

Before beginning any underground work, notify the City of Houston's Chief Inspector, Public Works and Engineering, to establish the locations of any existing electrical systems for lighting facilities within the limits of this project.

#### Item 5: Control of Work

Submit shop drawings electronically for the fabrication of items as documented in Table 1 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e submit guide.pdf. References to 11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

General Notes

#### Sheet D

Sheet D

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Sheet E

#### County: Montgomery

Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Table 1 2014 Construction Specification Required Shop/Working Drawing Submittals - Consultant Generated Plans									
Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/ Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)			
7.16.1&.2	Construction Load Analyses	Y	Y	Y	D	WD			
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	D	WD			
403	Temporary Special Shoring	Y	N	Y	D	WD			
420	Formwork/Falsework	Y	N	Y	D	WD			
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	D	SD			
425	Optional Design Calculations (Prstrs Bms)	Y	Y	Y	D	SD			
425	Prestr Concr Sheet Piling	Y	Y	N	D	SD			
425	Prestr Concr Beams	Y	Y	N	D	SD			
425	Prestr Concr Bent	Y	Y	N	D	SD			
426	Post Tension Details	Y	Y	N	D	SD			
434	Elastomeric Bearing Pads (All)	Y	Y	N	D	SD			
441	Bridge Protective Assembly	Y	Y	N	D	SD			
441	Misc Steel (various steel assemblies)	Y	Y	N	D	SD			
441	Steel Pedestals (bridge raising)	Y	Y	N	D	SD			
441	Steel Bearings	Y	Y	N	D	SD			
441	Steel Bent	Y	Y	N	D	SD			
441	Steel Diaphragms	Y	Y	N	D	SD			
441	Steel Finger Joint	Y	Y	N	D	SD			
441	Steel Plate Girder	Y	Y	N	D	SD			
441	Steel Tub-Girders	Y	Y	N	D	SD			
441	Erection Plans, including Falsework	Y	N	Y	D	WD			
449	Sign Structure Anchor Bolts	Y	Y	N	D	SD			
450	Railing	Y	Y	N	D	SD			
462	Concrete Box Culvert	Y	Y	N	D	SD			
462	Concrete Box Culvert (Alternate Designs Only,calcs reqd.)	Y	Y	Y	D	SD			
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	D	SD			
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	D	SD			
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs reg'd.)	Y	Y	Y	D	SD			
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	D	SD			
467	Pre-cast Safety End Treatments	Y	Y	N	D	SD			
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	D	SD			
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	D	SD			
613	High Mast Illumination Poles (Non- standard only, calcs regd.)	Y	Y	Y	D	SD			
627	Treated Timber Poles	Y	Y	N	D	SD			

General Notes

Sheet E

#### County: Montgomery

**Control:** CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	D
647	Large Roadside Sign Supports	Y	Y	Y	D
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	D
650	Sign Structures	Y	Y	N	D
680	Installation of Highway Traffic Signals	Y	Y	Ν	D
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	D
684	Traffic Signal Cables	Y	Y	N	D
685	Roadside Flashing Beacon Assemblies	Y	Y	Ν	D
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	D
687	Pedestal Pole Assemblies	Y	Y	N	D
688	Detectors	Y	Y	N	D
784	Repairing Steel Bridge Members	Y	Y	Y	D
SS	Prestr Concr Crown Span	Y	Y	N	D
SS	Sound Barrier Walls	Y	Y	Y	D
SS	Camera Poles	Y	Y	Y	TMS
SS	Pedestrian Bridge (Calcs reg'd.)	Y	Y	Y	D
SS	Screw-In Type Anchor Foundations	Y	Y	N	D
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS
SS	Spread Spectrum Radios for Signals	Y	Y	Ν	D
SS	VIVDS System for Signals	Y	Y	N	D
SS	CTMS Equipment	Y	Y	N	TMS

Notes:

Document flow for Working Drawings differs from Shop Drawings in that Working Drawings must be submitted to the Engineer rather than the Engineer of Record and they are for the information of the Engineer only; an approval stamp and distribution to all project offices is not required.

Key to Reviewing Party

D – Consultant: Submit to Engineer of Record at vobregon@HNTB.com
TMS – Traffic Management System at vobregon@HNTB.com

#### Item 7: Legal Relations and Responsibilities

Maintain the roadway slope stability. Maintaining slope stability is subsidiary to the various bid items.

If the work is on or in the vicinity of an at-grade railroad crossing, involves incidental work on railroad right of way, or involves construction of a railroad grade separation structure, notify the railroad company's Division Engineer and the Engineer at least 30 days before performing any work on the railroad right of way and make arrangements for railroad flaggers unless otherwise shown in the contract. Obtain the required Railroad Right of Entry Permit from the railroad company. Payment of applicable permit fees is the responsibility of the Contractor. Acquiring the Railroad Right of Entry Permit is a lengthy process, allow sufficient time for this.

General Notes

#### Sheet F

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Sheet F

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Sheet G

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

No significant traffic generator events have been identified.

#### Item 8: Prosecution and Progress

County: Montgomery

Create, maintain, and submit for approval, a Critical Path Method (CPM) project schedule using computer software that is fully compatible with the latest version of Primavera Systems, Inc. or Primavera Project Planner (P3 or P6).

The Engineer will supply bidders, upon written request, one electronic copy of the time determination schedule. The time determination schedule provided is for informational use only and is not intended for bidding or construction purposes.

The Engineer will not adjust the number of days for the project and milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Working days will be computed and charged based on a 6-day workweek in accordance with Section 8.3.1.2.

Provide a virus-free computer disk or other acceptable electronic media containing the Primavera construction schedule.

#### Item 100: Preparing Right of Way

Clean existing ditches under fill sections of undesirable materials including grass, muck, and trash. Perform this work in accordance with the Construction section of the Item, "Preparing Right of Way." This work is subsidiary to this bid Item.

The Item, "Preparing Right of Way" will be measured for payment only in those designated areas shown on the plans. Preparing right of way necessary to perform construction that is outside designated areas is subsidiary to this bid Item.

Remove abandoned utilities that are in conflict with the new utilities, at no expense to LHRA.

Reestablish and maintain right of way stakes after completing the right of way preparation activities and until the new utilities are in place.

Remove and assume ownership of the existing ground mounted signs within the limits of roadway construction unless otherwise noted or directed. This work is subsidiary to the Item, "Preparing Right of Way."

General Notes

Item 110: Excavation

County: Montgomery

**Control:** CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

If manipulating the excavated material requires moving the same material more than once to accomplish the desired results, the excavation is measured and paid for only once regardless of the manipulation required.

Transition the ditch grades and channel bottom widths at structure locations. Use only approved channel excavation in the embankment.

The total excavation quantity shown on the plans includes the quantity for excavating to 2 ft. behind the back of the proposed curb.

#### Item 132: Embankment

If salvaged base is used for the embankment material, break it into small pieces to achieve the required density and to facilitate placing in the embankment. Obtain approval of the material before placing in the embankment.

Furnish Type C material with a maximum Liquid Limit (LL) of 65, a minimum Plasticity Index (PI) of 5, and composed of suitable earth material such as loam, clay, or other materials that form a suitable embankment.

The embankment material used on the project which has a Liquid Limit exceeding 45 will be tested for Liquid Limits at the rate of one test per 20,000 cu. yd. or per total quantity less than 20,000 cu. yd., unless otherwise directed. Only use material that passes the above tests.

Item 161: Compost Item 162: Sodding for Erosion Control Item 164: Seeding for Erosion Control Item 166: Fertilizer Item 168: Vegetative Watering

Refer to the "Fertilizer, Seed, Sod, Straw, Compost, and Water" plan sheet for material specifications, application rates, and for watering requirements.

#### Item 204: Sprinkling

Perform subsidiary sprinkling as required under various other items in accordance with the Item, "Sprinkling."

Sprinkling for dust control is subsidiary to the various bid items.

#### Item 210: Rolling

Use a medium pneumatic roller meeting the requirements of Item 210 as directed. This work is subsidiary to the various bid items. On every asphalt shot, use a minimum of 3 pneumatic rollers or as directed. Use approved rolling patterns. Successive asphalt shots will not be allowed until acceptable rolling has been accomplished on the preceding asphalt shot.

General Notes

#### Sheet H

Sheet H

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Project Name: Northpark Drive Overpass Project (T-1013)

#### Item 260: Lime Treatment (Road-Mixed)

County: Montgomery

For slurry placing, before discharging through the distributors, sufficiently agitate or mix the lime and water to place the lime in suspension and to obtain a uniform mixture.

The Engineer will observe the lime treatment that the Contractor elects to open to construction traffic immediately after compaction. If the construction traffic damages the subgrade, route the traffic off the damaged section in accordance with the standard specification. If the construction traffic does not damage the subgrade, cure the subgrade until other courses of material cover it. Apply these courses within 14 days with a maximum curing period of 7 days.

Place the hydrated and the commercial lime as a water suspension or slurry according to the slurry placing method shown in Section 260.4.3.2, "Slurry Placement."

Use the type of lime at particular locations as directed.

Place the quicklime dry or as a slurry.

For the dry quicklime, a spreader box is not required if the lime material is evenly distributed.

In limited areas, the Contractor may construct the lime slurry subgrade under a sequence of work in which the application, mixing, and compaction are completed in the same working day, if approved by the Engineer.

Provide documentation from certified public scales showing gross, tare, and net weights. Provide producer's delivery tickets also showing gross, tare, and net weights. Completely empty the lime trailers at the project site. The Engineer may direct the Contractor to reweigh any shipment of lime on certified scales. The cost of this operation is subsidiary to the Item, "Lime Treatment (Road-Mixed)."

The percentage of lime shown on the plans is estimated on the basis of engineering tests. If soil tests made during construction indicate properties different than those originally anticipated, the Engineer may vary the percentage of the lime to provide soil characteristics similar to those of the preliminary tests.

Mix the lime with the new base material in an approved pugmill type stationary mixer.

#### Item 276: Cement Treatment (Plant-Mixed)

Before placing the new base, wet and coat the vertical construction joints between the new base and the previously placed base with dry cement.

General Notes

Sheet I

County: Montgomery

Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

If the total thickness of the cement treatment is greater than 8 in., compact it in multiple lifts in accordance with Section 276.4.3, "Compaction." Place the courses in the same working day unless otherwise approved.

Use Class N Cement Treatment containing 4.5 percent cement based on the dry weight of the aggregate. There is no minimum compressive strength requirement for this Item.

The requirement for core drilling to determine the thickness of cement treatment is waived if using less than 500 sq. yd. at one location.

For widening the existing pavement, the Engineer may waive the requirements for preparing the subgrade by scarifying and compacting if the as-cut subgrade can be maintained to the density of the natural ground and to a uniform consistency when placing the base course. Keep the subgrade wet.

Compact in accordance with the standard specifications and complete the finishing operations within a period of 5 hours after adding the cement to the base material.

Cure the final course of cement treatment using an asphalt distributor that distributes the approved curing material and water mixture material at a rate of 0.25 gallons per square-yard evenly and smoothly or as recommended by the manufacturer at the recommended dilution rate, under a pressure necessary for proper distribution. Provide a curing material meeting the requirements of the Item, "Asphalts, Oils, and Emulsions" for curing the cement treatment. Use the following materials for curing the courses of cement treatment:

Curing Material	Application
Water	All courses, except final cou
PCE	Final course

Continue curing until placing another course or opening the finished section to traffic.

Spread the material so that the layers of base are uniform in depth and in loose density before compacting.

Unless otherwise directed, place the next pavement layer within 7 working days of placing the base.

#### Item 292: Asphalt Treatment (Plant-Mixed)

If using the iron ore topsoil as the primary aggregate, meaning 80 percent or more by weight of the total mixture, the requirements for the water susceptibility test are waived.

Mixtures containing the iron ore topsoil are exempted from test methods TEX-217-F (Part I, separation of deleterious material and Part II, decantation test for coarse aggregate) and TEX-203-F (Sand Equivalent Test).

General Notes

#### Sheet J

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Sheet J

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#### Sheet K

#### County: Montgomery

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Assume responsibility for proportioning the materials entering the asphalt mixture, regardless of the type of plant used.

#### Furnish the mix designs for approval.

Compact the courses to a minimum density of 95 percent of the maximum density as determined using test method TEX-126-E.

#### Meet the following grading requirements:

Sieve	Percent Passing
Size	Grade 4 (Bondbreaker)
1-3/4 in.	-
1 in.	-
1/2 in.	100
No. 4	30 - 70
No. 40	15 - 45

Physical requirements are as follows:

Maximum Plasticity Index (PI) = 8 Maximum Liquid Limit (LL) = 35 Maximum Wet Ball Mill = 50 (crushed stone) Maximum LA Abrasion = 50 (iron ore)

If blending the materials, perform the Wet Ball Mill test for the composite aggregate.

Form bituminous mix incorporating 3.5 to 7 percent asphaltic binder by dry weight.

For nominal aggregate size less than 0.5 in., design the mix in accordance with test method TEX-204-F. The minimum stability in accordance with TEX-208-F is 30 percent with a laboratory molded density of 96 percent plus or minus 1.5 percent.

If the layer thickness after placing is 1.25 in. or less, the bondbreaker is exempt from the in-place density control described in Section 292.4.5, "Compaction."

#### Item 360: Concrete Pavement

Where the pavement curb is left off for a later tie, provide the dowels or the tie bars as indicated on the paving detail sheets. The dowel bars and tie bars are subsidiary to the various bid items.

Repair portions of the concrete pavement surfaces that are damaged while in a plastic state before that area receives permanent pavement markings and opens to traffic. Perform repairs that are structurally equivalent to and cosmetically uniform with the adjacent undamaged areas. Do not repair by grouting onto the surface.

General Notes

Sheet K

County: Montgomery

Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Equip the batching plants to proportion by weight, aggregates and bulk cement, using approved proportioning devices and approved automatic scales.

For mono curb, the curb height transitions will be paid at the contract unit price of the larger curb height in the transition. The 2.5-in. laydown curbs for driveways will be paid at the unit price bid for the Item, "Conc Curb (Mono) (Ty II)."

High-early strength cement may be used for frontage road and city street intersection construction.

Do not use limestone dust of fracture as fine aggregate.

If the concrete design requires greater than 5.5 sacks of cementitious material per cubic yard, obtain written approval. If placing concrete pavement mixes from April 1 to October 31, inclusive, use Mix Design Option 1 as specified in Section 421.4.2.6.1.

Perform saw cutting as shown on the plans in accordance with Section 360.4.10, "Sawing Joints." This saw cutting is subsidiary to this bid Item.

The pay limits for concrete pavements with traffic rails extends to the outside edge or back of the traffic rail.

Complete the entire Fast Track Concrete construction process, from the time the Fast Track Work Area is closed to traffic, to the time the Fast Track Work Area is opened to traffic. The Fast Track operation includes, but is not limited to, traffic control, existing pavement and subgrade removal, preparation of subgrade, placement of steel, placement of Fast Track concrete pavement, cure time, striping, etc. Perform work in the Fast Track Work Area in an expeditious manner, within the allowable time period for any area shown below:

	Fast Tra	ack W	/ork /	Area
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#### Allowable Duration

- Northpark Drive / IH 69 NBFR Int. (TCP P2-S3): 2. Northpark Drive / IH 69 NBFR Int. (TCP P3-S1):
- 3. Northpark Drive / Loop 494 Int. (TCP P2-S2):
- 4. Northpark Drive / Loop 494 Int. (TCP P2-S3):
- 5. Northpark Drive / Loop 494 Int. (TCP P3-S1):
- 6. Northpark Drive / Russell Palmer Int. (TCP P1-S2):
- 7. Northpark Drive / Russell Palmer Int. (TCP P1-S3):
- 8. Northpark Drive / Russell Palmer Int. (TCP P1-S4):
  - 2 weekend days maximum

Failure to perform any Fast Track Work Area construction within the above time frames will be cause for the Engineer to require the Contractor to shut down all other construction operations to ensure all resources are directed toward the completion of the Fast Track operation. This shutdown will remain in force until the Fast Track operation is complete. Such a shutdown will not warrant additional time, time suspension, or any additional costs to LHRA.

General Notes

#### Sheet L

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Sheet L

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#### Sheet M

County: Montgomery

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Unless otherwise directed in writing, provide Class HES concrete with a minimum average flexural strength of 425 psi or a minimum average compressive strength of 3,000 psi in 16 hours. When directed in writing, open the pavement to traffic before the minimum requirements have been attained.

When needed, place and remove forms in accordance with Section 360.4.5, except do not remove forms until at least 6 hours after concrete has been placed. The time for the form removal may be extended with the direction of the Engineer if weather or other conditions make it advisable.

Sprinkling and rolling, required for the compaction of the rough subgrade in advance of finegrading are subsidiary to this Item. Maintenance of a moist condition of the subgrade in advance of fine-grading and concrete is subsidiary work, as provided above.

#### Item 400: Excavation and Backfill for Structures

Plugging existing pipe culverts is subsidiary to the various bid items.

#### Item 416: Drilled Shaft Foundations

Include the cost for furnishing and installing anchor bolts mounted in the drilled shafts in the unit bid price for the various diameter drilled shafts.

The Engineer may test using ultrasonic methods the anchor bolts for overhead sign supports, light standards, and traffic signal poles after they are installed. Replace faulty anchor bolts as directed. Do not weld the anchor bolts.

#### Item 420: Concrete Substructures

Unless otherwise noted, use Class C concrete with an ordinary surface finish for signal, lighting, or sign structure foundations.

Mass concrete is a plans quantity item.

#### Item 423: Retaining Walls

Place concrete riprap mow strips for retaining walls as shown on the plans and in accordance with the Item, "Riprap." Use Class B concrete reinforced with No. 4 bars spaced at 18 in. centers each direction and placed 2 in. below the surface. This work is paid for under the Item, "Riprap."

Provide and maintain positive drainage away from the earth wall system, including the leveling pad, for the contract duration.

County: Montgomery

Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Approved Mechanically Stabilized Earth (MSE) Wall Systems are listed at the website below or from TxOT's home page>Business>Bridge>Retaining Walls>Approved MSE Panel Systems:

http://www.txdot.gov/business/resources/approved-systems/mse-wall.html

#### Item 432: Riprap

If stone riprap is shown on the plans, use common stone riprap in accordance with Section 432.2.3.3, placed dry in accordance with Section 432.3.2.3. Do not grout. Crushed concrete may also be used.

Item 462: Concrete Box Culverts and Drains Item 464: Reinforced Concrete Pipe

Rubber gaskets are required for concrete pipe joints except for connections of safety end treatments, driveway culverts, and joints between the existing pipes and extensions.

Contractor shall use O-Ring type gaskets for all round pipe applications. No Ram-Nek plastic gaskets will be allowed.

If performing the work under the Item, "Jacking, Boring, or Tunneling Pipe or Box," use tongue and groove pipe instead of rubber gaskets at these locations.

Open, install, and backfill each section, or a portion of a section, in the same day at locations requiring pipe culverts under existing roadways.

Place the pipe drains across existing roadways half at a time to allow passage of traffic. No trenches may remain open overnight.

Known locations of existing stub-outs are shown on the plans, but these stub-outs may be in a different position or condition. Delays, inconveniences, or additional work required will not be a basis for additional compensation.

Provide leave-outs or holes in the proposed storm drain structures and pipes for drainage during interim construction. This work is subsidiary to the various bid items.

The flowline elevations of side road structures are based on the proposed ditches. Field-verify these elevations and adjust them as necessary to meet the field conditions. Before placing these structures, prepare and submit for approval, the data (revised elevation, alignment, length, etc.) for the adjusted structures.

If groundwater is encountered while installing the storm drain system, install a suitable dewatering system to facilitate construction of the storm drains. The costs for materials and labor required to install and maintain this system are subsidiary to the Item, "Reinforced Concrete Pipe."

General Notes

General Notes

Sheet M

#### Sheet N

Sheet N

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County: Montgomery

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

#### Item 465: Junction Boxes, Manholes, and Inlets

If required on the plans, build manholes and inlets to stage 1 construction, cover with temporary pavement, and complete in a later phase of construction. This temporary covering and pavement are subsidiary to the various bid items.

Construct manholes and inlets in graded areas, first to an elevation at least 4 in. above the top of the highest entering pipe and cover with a wooden cover. Complete the construction of such manholes and inlets to the finished elevation when completing the grading work for such manholes and inlets. Adjust the final elevation, if required, since this elevation is approximate.

Construct manholes and inlets in paved areas to an elevation so their temporary wooden covers are flush with the surface of the base material.

Do not leave excavations or trenches open overnight.

#### Item 502: Barricades, Signs, and Traffic Handling

Use a traffic control plan for handling traffic through the various phases of construction. Follow the phasing sequence unless otherwise agreed upon by the Engineer. Ensure this plan conforms to the latest "Texas Manual on Uniform Traffic Control Devices" and the latest Barricade and Construction (BC) Standard Sheets. The latest versions of Work Zone Standard Sheets WZ (BTS-1) and WZ (BTS-2) are the traffic control plan for the signal installations.

Submit changes to the traffic control plan to the Engineer. Provide a layout showing the construction phasing, signs, striping, and signalizations for changes to the original traffic control plan.

Furnish and maintain the barricades and warning signs, including the necessary temporary and portable traffic control devices, during the various phases of construction. Place and construct these barricades and warning signs in accordance with the latest "Texas Manual on Uniform Traffic Control Devices" for typical construction layouts.

Cover work zone signs when work related to the signs is not in progress, or when any hazard related to the signs no longer exists.

Keep the delineation devices, signs, and pavement markings clean. This work is subsidiary to the Item, "Barricades, Signs, and Traffic Handling."

If a section is not complete before the end of the workday, pull back the base material to the existing pavement edge on a 6H: 1V slope. Edge drop-offs during the hours of darkness are not permitted.

Cover or remove the permanent signs and construction signs that are incorrect or that do not apply to the current situation for a particular phase.

General Notes

Sheet O

County: Montgomery

Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

Use traffic cones for daytime work only. Replace the cones with plastic drums during nighttime hours.

Place positive barriers to protect drop-off conditions greater than 2 ft. within the clear zone that remain overnight.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer.

Provide full-time, off-duty, uniformed, certified peace officers, as part of traffic control operations. The peace officers must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. The cost of the officers is paid for on a force account basis.

A minimum of 7 days in advance of any total closure, notify the Houston District Public Information Office of which roadways, ramps, intersections, or lanes will be closed, the dates they will remain closed, and when they will be opened again to traffic.

A minimum of 7 days in advance of any total closure, place a portable changeable message (PCM) sign at the location of each total closure which informs the traveling public of the details of the closure. Alternately, if the Traffic Control Plan provides a positive barrier at the location, a non-trailer mounted static message board sign behind the positive barrier may be used in place of a PCM.

Minimize the number of working days for street closures. The following table lists the maximum number of working days allowed for each street closure. The closure period for each intersection occurs only during the phase when constructing that street, unless otherwise directed. Reopen the street within the number of working days allowed; otherwise the Engineer may cease construction activities not affiliated with reopening the closed street, until it fully reopens to the traveling public. Time charges will not be suspended nor increased to compensate for this occurrence.

Street Name	Number of Working Days
	Allowed for Closure
Loop 494	2 days
Russell Palmer Road	2 days
Northpark Dr / Loop 494 Intersection	2 days

General Notes

#### Sheet P

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#### Sheet Q

County: Montgomery

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Before closing any City of Houston sidewalk, one or more city street lanes, or entire city streets during construction, obtain a permit to do so from the City. Obtain the required permit in person at the City of Houston Permit Office, or apply online at http://www.gims.houstontx.gov.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

#### Item 512: Portable Traffic Barrier

Where required by the Engineer, provide anchor pins for Type 2 Low Profile Concrete Barriers (LPCB) as shown on the current LPCB standard. Anchor pins are subsidiary to the Low Profile Concrete Barrier.

#### Item 514: Permanent Concrete Traffic Barrier

Add a 3/4-in. longitudinal chamfer to the Single Slope Concrete Barrier (SSCB) railing. Provide a continuous chamfer typically located 6 in. above the final grade. The cost of this is subsidiary to the Item, "Permanent Concrete Traffic Barrier."

#### Item 529: Concrete Curb, Gutter, and Combined Curb and Gutter Item 530: Intersections, Driveways, and Turnouts Item 531: Sidewalks

An air-entraining admixture is not required.

For concrete curbs, use Grade 7 aggregate conforming to Section 421.2.6 of the Item, "Hydraulic Cement Concrete."

For driveways and turnouts, coarse aggregate Grade No. 3 through No. 8 conforming to the gradation requirements specified in the Item, "Hydraulic Cement Concrete" will be permitted.

For reinforcing steel in sidewalks and pedestrian ramps, use No. 4 bars at a maximum 18 in. spacing center-to-center in both directions.

#### Item 540: Metal Beam Guard Fence

Painting the timber posts is not required.

Use timber posts for galvanized steel metal beam guard fence, except for anchorage at turned down ends.

#### General Notes

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Project Name: Northpark Drive Overpass Project (T-1013)

Furnish and install wood blocks between the rail elements and the timber posts as detailed on the plans. These block-outs are subsidiary to this bid Item.

The quantity of the metal beam guard fence is subject to change.

Provide a mow strip as shown on the plans, at metal beam guard fence locations, including any guardrail end treatments.

Galvanize the rail elements supplied for this project by using a Type II Zinc Coating.

At locations requiring attachment of Metal Beam Guard Fence (MBGF) to concrete railing or concrete traffic barrier, repair and fill any existing holes in the railing or barrier that are not in the correct location for attaching the new MBGF. Perform this work in accordance with the Item, "Concrete Structure Repair." Existing anchor bolt holes that cannot be utilized must be filled with an epoxy grout before drilling new holes. Then core-drill new holes in the correct locations and repair any resulting spalls at no expense to the Department. This work is considered subsidiary to the MBGF transition section (Item 540).

#### Item 545: Crash Cushion Attenuators

After completing the project, return remaining unused crash cushion attenuators units to the Area Office Maintenance yard or as directed, at no cost to the Department.

A MASH compliant crash cushion attenuator is required for every temporary and permanent installation.

#### Item 556: Pipe Underdrains

Do not use crushed blast furnace slag.

Lay the underdrain pipe on a slope to insure proper drainage.

Tie the under drain pipe into the inlets as shown on the plans.

#### Item 610: Roadway Illumination Assemblies

The cost of providing the electrical conductor in the pole foundation or in the pole base to make connections is subsidiary to the roadway illumination assembly. The quantity for payment is the surface distance between locations.

Fabricate steel roadway illumination poles in accordance with the latest TxDOT RIP (Roadway Illumination Poles) Standards. Poles manufactured according to the latest RIP Standards require no shop drawings. Alternate designs to TxDOT's RIP Standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically.

General Notes

#### Sheet R

Sheet R

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#### Sheet S

County: Montgomery

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25 ft. above the surrounding terrain, provide shop drawings (see ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e submit guide.pdf) and calculations that are sealed, signed, and dated by a professional engineer registered or licensed in Texas.

Supply anchor bolt assemblies as shown on the RIP standard sheets, unless a larger capacity bolt assembly is required for the 3-second gust wind speed and mounting elevation at the pole installation location.

#### Item 618: Conduit

When backfilling bore pits, ensure that the conduit is not damaged during installation or due to settling backfill material. Compact select backfill in 3 equal lifts to the bottom of the conduit; or if using sand, place it 2 in. above the conduit. Ensure backfill density is equal to that of the existing soil. Prevent material from entering the conduit.

Construct bore pits a minimum of 5 ft. from the edge of the base or pavement. Close the bore pit holes overnight.

Unless otherwise shown on the plans, install underground conduit a minimum of 24 in. deep. Install the conduit in accordance with the latest National Electrical Code (NEC) and applicable TxDOT standard sheets. Place conduit under driveways or roadways a minimum of 24 in. below the pavement surface.

If using casing to place bored conduit, the casing is subsidiary to the conduit.

If placing the conduit under existing pavement to reach the service poles, bore the conduit in place and extend it a minimum distance of 5 ft. bey ond the edge of shoulder or the back of curb.

Where PVC, duct cable, and HDPE conduit 1 in. and larger is allowed and installed per Department standards, provide a PVC elbow in place of the galvanized rigid metal elbow required by the Electrical Details standards. Ensure the PVC elbow is of the same schedule rating as the conduit to which it is connected. Use only a flat, high tensile strength polyester fiber pull tape to pull conductors through the PVC conduit system.

Remove conductor and conduit to be abandoned to 1 ft. below the ground level. This work is subsidiary to the various bid items.

Do not use cast iron junction boxes in concrete traffic barriers and single slope traffic barriers. Use polymer concrete junction boxes in place of the cast iron junction boxes shown on standard sheets CTBI (3), CTBI (4), and SSCB (4). Mount the junction boxes flush (+0 in., -1/2 in.)with the concrete surface of the concrete barrier.

General Notes

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Project Name: Northpark Drive Overpass Project (T-1013)

Use materials from pre-qualified producers as shown on TxDOT's Construction Division (CST) material producers list. Check the latest links on TxDOT's website for the list. The category is "Roadway Illumination and Electrical Supplies." The polymer concrete barrier box is subsidiary to Item 618, "Conduit."

#### Item 620: Electrical Conductors

Test each wire of each cable or conductor after installation. Incomplete circuits or damage to the wire or the cable are cause for immediate rejection of the entire cable being tested. Remove and replace the entire cable at no expense to LHRA. Also test the replacement cable after installation.

When pulling cables or conductors through the conduit, do not exceed the manufacturer's recommended pulling tensions. Lubricate the cables or conductors with a lubricant recommended by the cable manufacturer.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holders as shown on TxDOT's Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Items 610 and 620. Provide 10 Amp time delay fuses.

Ensure that circuits test clear of faults, grounds, and open circuits.

Split bolt connectors are allowed only for splices on the grounding conductors.

For Roadside Flashing Beacon Assemblies (Item 685) and Pedestal Pole Assemblies (Item 687) within the project, provide single-pole breakaway disconnects as shown on the Construction Division (CST) material producers list. Check the latest link on the Department's website for this list. The category is "Roadway Illumination and Electrical Supplies." The fuse holder is shown on the list under Item 685. For underground (hot) conductors, install a breakaway connector with a dummy fuse (slug). Provide dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).

For electrical licensing and electrical certification requirements for this project, see Item 7 of the Standard Specifications and any applicable special provisions to Item 7.

#### Item 624: Ground Boxes

The ground box locations are approximate. Alternate ground box locations may be used as directed, to avoid placing in sidewalks or driveways.

Ground metal ground box covers. Bond the ground box cover and ground conductors to a ground rod located in the ground box and to the system ground.

General Notes

#### Sheet T

Sheet T

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#### Sheet U

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#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Ground the existing metal ground box covers as shown on the latest standard sheet ED (4)-14.

During construction and until project completion, provide personnel and equipment necessary to remove ground box lids for inspection. Provide this assistance within 24 hours of notification.

Construct concrete aprons in accordance with the latest standard sheet ED (4)-14. Make the depth of the concrete apron the same as the depth of the ground box, except for Type 1 and Type 2 ground boxes. For Type 1 or Type 2 ground boxes, construct the concrete apron in accordance with details shown on the "Ground Box Details Installations" standard.

#### Item 628: Electrical Services

Verify and coordinate the electrical service location with the engineering section of the appropriate utility district or company.

Identify the electrical service pole with an address number assigned by the Utility Service Provider. Provide 2-in. numerals visible from the highway. Provide numbers cut out aluminum figures nailed to wood poles or painted figures on steel poles or service cabinets.

#### Item 662: Work Zone Pavement Markings

At the end of each workday, mark roadways that remain open to traffic during construction operations with standard pavement markings, in accordance with the latest "Texas Manual on Uniform Traffic Control Devices."

Using raised markers for removable work zone pavement markings on final concrete surfaces is optional.

For transition lane lines and detour lane lines, use raised pavement markers as shown for solid lines on the latest Barricade and Construction standard sheet for "Work Zone Pavement Marking Details."

#### Item 666: Reflectorized Pavement Markings

Use Type III glass beads for thermoplastic and multipolymer pavement markings.

Use a 0.100 in. (100 mil) thickness for thermoplastic pavement markings, measured to the top of the thermoplastic, not including the exposed glass beads.

Use a 0.022 in. (22 mil) thickness for multipolymer pavement markings, measured to the top of the multipolymer, not including the exposed glass beads.

For roadways with asphalt surfaces to be striped with work zone or permanent thermoplastic markings, the Contractor has the option to apply paint and beads markings for a maximum 30-

General Notes

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**Control:** CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

day period until placing the thermoplastic markings, or until starting the succeeding phase of work on the striped area. Maintain the paint and beads markings, at no expense to LHRA, until placing the thermoplastic markings or starting the succeeding phase of work on the striped area. The work zone markings, whether paint and beads or thermoplastic, are paid under the Item, "Work Zone Pavement Markings" and the markings are paid for only once for the given phase of construction.

If using paint and bead markings as described above, purchase the traffic paint from the open market.

If the Type II markings become dirty and require cleaning by washing, brushing, compressed air, or other approved methods before applying the Type I thermoplastic markings, this additional cleaning is subsidiary to the Item, "Reflectorized Pavement Markings."

Establish the alignment and layout for work zone striping and permanent striping.

Stripe all roadways before opening them to traffic.

Place pavement markings under these items in accordance with details shown on the plans, the latest "Texas Manual on Uniform Traffic Control Devices," or as directed.

When design details are not shown on the plans, provide pavement markings for arrows, words, and symbols conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Place the pedestrian crosswalk pavement markings only after the pedestrian signals and push buttons are installed and operating.

#### Item 677: Eliminating Existing Pavement Markings and Markers

Remove existing pavement markings on concrete or asphalt surfaces by flail milling or as directed.

Item         Description         Limit           134         Backfilling Pavement Edges         0.25 Gal. / 9           • Asphalt Emulsion         0.25 Gal. / 9           150         Blading         1 Hr. / Stati           247         Flexible Base         0.25 Gal. / 9	Basis of Estimate						
134     Backfilling Pavement Edges       • Asphalt Emulsion     0.25 Gal./5       150     Blading       247     Flexible Base	and Rate						
Asphalt Emulsion 0.25 Gal./5     Blading 1 Hr. / Stati     Z47 Flexible Base							
150     Blading     1 Hr. / Stati       247     Flexible Base	Sq. Yd.						
247 Flexible Base	on						
Crushed Stone 138 Lb. / Cu	1. Ft.						
260 Lime Treatment (Road-Mixed)							
For materials used as subgrade *							
<ul> <li>Lime(HYD, COM, or QK)(SLRY) or 6 % by weight</li> </ul>	tht based on						
QK(DRY) 100 Lb. / C	1. Ft. subgrade						

General Notes

#### Sheet V



Sheet V

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Sheet W

#### County: Montgomery

#### Control: CSJ 0912-37-232

Project Name: Northpark Drive Overpass Project (T-1013)

Item	Description	Limit and Rate	Unit
263	Lime Treatment (Plant-Mixed)		TON
	Hydrated Lime	3 % by weight of flexible	
	-	base	
275	Cement Treatment (Road-Mixed)		SY
	For materials used as subgrade *		
	• Cement	6 % by weight based on	TON
		100 Lb. / Cu. Ft. subgrade	
292	Asphalt Treatment (Plant-Mixed)	110 Lb. / Sq. YdIn.	TON
	Asphalt	5 % by weight	
	Aggregate	95 % by weight	
310	Prime Coat	0.25 Gal. / Sq. Yd.	GAL
316	Seal Coat		
	Asphalt	0.40 Gal. / Sq. Yd.	GAL
	<ul> <li>Aggregate</li> </ul>	1/100 Cu. Yd. / Sq. Yd.	CY
	A-R Binder		
	<ul> <li>Asphalt (Rubber)</li> </ul>	0.55 Gal. / Sq. Yd.	GAL
	Aggregate	1/100 Cu. Yd. / Sq. Yd.	CY
340	Dense-Graded Hot Mix Asphalt (Small	110 Lb. / Sq. YdIn.	TON
	Quantity)		
	Asphalt	6 % by weight	
	<ul> <li>Aggregate</li> </ul>	94 % by weight	
	Tack Coat	0.06 G-1 /G- X1	
	<ul> <li>Applied on new HMA</li> </ul>	0.06 Gal. / Sq. Yd.	
	<ul> <li>Applied on Existing HMA</li> </ul>	0.09 Gal. / Sq. Yd.	
	<ul> <li>Applied on Milled HMA</li> </ul>	0.11 Gal. / Sq. Yd.	
342	Permeable Friction Course (PG-Binder)	95 Lb. / Sq. YdIn.	TON
	Asphalt	6.5 % by weight	
	Aggregate	93.5 % by weight	
	Permeable Friction Course (A-R Binder)	95 Lb. / Sq. YdIn.	TON
	Asphalt	8 % by weight	
	Aggregate	92 % by weight	
3000	Crack Attenuating Mixture	115 Lb. / Sq. YdIn.	TON
	Asphalt	7.5 % by weight	
	<ul> <li>Aggregate</li> </ul>	92.5 % by weight	

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Project Name: Northpark Drive Overpass Project (T-1013)

Item	Description	Limit and Rate
3076	Dense-Graded Hot Mix Asphalt	110 Lb. / Sq. YdIn.
	<ul> <li>Asphalt</li> </ul>	6 % by weight
	<ul> <li>Aggregate</li> </ul>	94 % by weight
	Tack Coat	
	<ul> <li>Applied on new HMA</li> </ul>	0.06 Gal. / Sq. Yd.
	<ul> <li>Applied on Existing HMA</li> </ul>	0.09 Gal. / Sq. Yd.
	<ul> <li>Applied on Milled HMA</li> </ul>	0.11 Gal. / Sq. Yd.
3077	Superpave Mixtures	100 Lb. / Sq. YdIn.
	Asphalt	8 % by weight
	<ul> <li>Aggregate</li> </ul>	92 % by weight

\* If used in existing roadway base, rate will be determined on a case by case basis.

General Notes

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#### Sheet X





Sheet X
### PART I - GENERAL NOTES

THE FOLLOWING NARRATIVE IS A SUPPLEMENT TO THE TRAFFIC CONTROL PLAN (TCP) SHEETS. THE TCP SHEETS DETAIL A GENERAL PLAN FOR CONSTRUCTION PHASING AND TRAFFIC MANAGEMENT.

THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, AND EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A TEXAS LICENSED ENGINEER.

THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

IF THE CONTRACTOR CHOOSES TO USE A DIFFERENT METHOD OF "TRAFFIC CONTROL PLANS" DURING THE CONSTRUCTION THAN WHAT IS OUTLINED IN THE CONTRACT DRAWINGS, THE CONTRACTOR SHALL BE RESPONSIBLE TO PREPARE AND SUBMIT AN ALTERNATE SET OF TRAFFIC CONTROL PLANS TO THE CITY OF HOUSTON PROJECT MANAGER FOR APPROVAL TEN WORKING DAYS PRIOR TO IMPLEMENTATION. THESE PLANS SHALL BE DRAWN TO SALE AND SHALL BE SEALED BY A LICENSED ENGINEER IN THE STATE OF TEXAS. TRANSPORTATION & DRAINAGE OPERATIONS REPRESENTATIVE APPROVAL IS REQUIRED TO ACCEPT THE PROPOSED CHANGES.

CONTRACTOR SHALL SECURE LANE/SIDEWALK CLOSURE PERMITS FROM TRANSPORTATION & DRAINAGE OPERATIONS (MOBILITY PERMIT SECTION AT HTTP://WWW.GIMS.HOUSTONTX.GOV/PORTALWS/MAINPORTAL.ASPX) BEFORE IMPLEMENTING THE TRAFFIC CONTROL PLAN. THE APPLICATION MUST BE SUBMITTED AT LEAST TEN BUSINESS DAYS PRIOR TO THE IMPLEMENTATION OF THE TRAFFIC CONTROL PLAN AND/OR BEGINNING CONSTRUCTION WORK. THE CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLANS, CONSTRUCTION SEQUENCING, AND CONSTRUCTION SCHEDULE WITH THE APPLICATION.

CONTRACTOR SHALL HAVE APPROVED TRAFFIC CONTROL PLAN AND PERMIT AT THE JOB SITE FOR INSPECTION AT ALL TIMES.

THE CONTRACTOR IS RESPONSIBLE FOR SCHEDULING AND COORDINATING ALL CONSTRUCTION ACTIVITIES WITH STAKE HOLDERS IN THE VICINITY INCLUDING EMERGENCY RESPONSE AGENCIES SUCH AS HOUSTON POLICE DEPARTMENT, HOUSTON FIRE DEPARTMENT, MONTGOMERY COUNTY, AND METROPOLITAN TRANSIT AUTHORITY.

CONTRACTOR SHALL BE RESPONSIBLE FOR ISSUING ALL WORK DIRECTIVES TO ALL SUB-CONTRACTORS, UTILITY COMPANIES, AND ALL OTHER ENTITIES PERFORMING CONSTRUCTION WORK ASSOCIATED WITH THE PROJECT.

NOTHING IN THESE NOTES OR PLANS SHALL RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT; INCLUDING SAFETY OF ALL MODES OF TRANSPORTATION, PERSONS, AND PROPERTY, AND THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO WORKING HOURS.

THE TRANSPORTATION & DRAINAGE OPERATIONS (MOBILITY PERMITS GROUP) PER THE DIRECTION OF THE CITY TRAFFIC ENGINEER HAVE THE RIGHT TO DEMAND THE INSTALLATION OF ADDITIONAL TRAFFIC CONTROL DEVICES OR MODIFICATIONS TO THESE PLANS AND NOTES, AS DEEMED NECESSARY TO PROMOTE THE SAFE AND ORDERLY FLOW OF TRAFFIC, INCLUDING PEDESTRIANS AND BICYCLES, THROUGH THE CONSTRUCTION WORK ZONE. THE CONTRACTOR SHALL COMPLY WITH THESE ADDITIONAL REQUEST OR MODIFICATIONS WITH DUE DILIGENCE.

ADDITIONAL OFF DUTY POLICE OFFICERS/FLAGGERS MAY BE REQUESTED TO DIRECT TRAFFIC WHEN LANES ARE BLOCKED AT THE DISCRETION OF THE CITY PROJECT MANAGER EVEN IF THEY ARE NOT SPECIFICALLY IDENTIFIED ON THE PROJECT PLANS.

THE CONTRACTOR SHALL REPLACE WITHIN 72 HOURS, ALL TRAFFIC SIGNAL LOOP DETECTORS DAMAGED DURING CONSTRUCTION.

IN GENERAL, A SOLAR POWERED FLASHING ARROW BOARD SHALL BE REQUIRED ON ALL MAJOR THOROUGHFARE LANE CLOSURES. EXCEPTIONS TO FLASHING ARROW BOARDS AND/OR IMPLEMENTATION ON RESIDENTIAL LANE CLOSURES SHALL BE APPROVED BY THE CITY TRAFFIC ENGINEER.

APPROVED TRAFFIC CONTROL PLAN SHALL BE IN PLACE BEFORE STARTING ANY EXCAVATION.

WHEN ENTERING OR LEAVING ROADWAYS CARRYING PUBLIC TRAFFIC, THE CONTRACTORS EQUIPMENT, WHETHER EMPTY OR LOADED SHALL IN ALL CASES YIELD TO PUBLIC TRAFFIC WITH THE ASSISTANCE OF CONTRACTOR PROVIDED CERTIFIED FLAGGER/PEACE OFFICER.

SPILLAGE RESULTING FROM HAULING OPERATIONS ALONG OR ACROSS ANY PUBLIC TRAVELED WAY SHALL BE REMOVED IMMEDIATELY BY THE CONTRACTOR.

MAINTAIN 2 LANES OF TRAFFIC IN EACH DIRECTION ON NORTHPARK DRIVE DURING PEAK HOURS, HOLIDAYS, AND NON-WORK DAYS.

NO LANES SHALL BE CLOSED DURING THE HOURS OF 7:00 AM TO 9:00 AM AND 4:00 PM TO 6:00 PM MONDAY THRU FRIDAY WITHOUT APPROVAL OF THE CITY TRAFFIC ENGINEER.

NO WORK SHALL BE PERFORMED IN RESIDENTIAL AREAS FROM 7:00 PM TO 7:00 AM.

HANGING OF BEAMS, PLACEMENT OF BRIDGE DECK FORMWORK AND CONCRETE POURS ABOVE ACTIVE TRAFFIC LANES ARE PROHIBITED. TO ACCOMPLISH NECESSARY BRIDGE CONSTRUCTION OVER ACTIVE LANES, THE CONTRACTOR MAY CLOSE LOOP 494 DURING OFF PEAK HOURS. CLOSURE OF NORTHPARK LANES DURING THIS TIME IS PROHIBITED. OFF PEAK HOURS FOR LOOP 494 ARE 9:00 PM TO 5:00 AM. THE CONTRACTOR SHALL PROVIDE ADEQUATE DETOURS FOR LOOP 494 THROUGH TRAFFIC DURING THIS TIME.

HANGING OF BEAMS, PLACEMENT OF BRIDGE DECK FORMWORK AND CONCRETE POURS ABOVE UPRR TRACKS MUST BE COORDINATED WITH TXDOT AND THE LOCAL UPRR REPRESENTATIVE (NAME: ROOKE JACKSON, NUMBER: 682-274-3898) PRIOR TO TEMPORARY CLOSURE OF TRACKS. SEE RAILROAD REQUIREMENTS FOR BRIDGE CONSTRUCTION.

CONSTRUCTION OF THE EBFR AND WBFR UPRR GRADE CROSSINGS MUST BE COORDINATED WITH TXDOT AND THE LOCAL UPRR REPRESENTATIVE (NAME: ROOKE JACKSON, NUMBER: 682-274-3898) PRIOR TO TEMPORARY CLOSURE OF TRACKS. SEE RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION

TO ACCOMPLISH NECESSARY PHASE 3 BRIDGE CONSTRUCTION ADJACENT TO FRONTAGE ROAD LANES, THE CONTRACTOR MAY CLOSE TWO FRONTAGE ROAD LANES AND TURNAROUNDS DURING OFF PEAK HOURS. ONE THROUGH TRAFFIC LANE MUST REMAIN OPEN. TRAFFIC ON THE OPEN LANE CAN BE TEMPORARILY STOPPED WITH THE USE OF FLAGGER OPERATIONS AND/OR LAW ENFORCEMENT PERSONEL. OFF PEAK HOURS FOR NORTHPARK DRIVE FRONTAGE ROADS ARE 9:00 PM TO 5:00 AM.

THE CONTRACTOR SHALL REQUEST APPROVAL FROM THE ENGINEER FOR ROADWAY CLOSURES AT LEAST 14 CALENDAR DAYS PRIOR TO COSURE. THE CONTRACTOR SHALL PLACE APPROVED ADVANCE WARNING MESSAGE 7 CALENDAR DAYS PRIOR TO CLOSURE.

THE CONTRACTOR SHALL MAINTAIN ACCESS TO DRIVEWAYS AT ALL TIMES. MANAGEMENT OF TRAFFIC FOR UTILITY CONSTRUCTION AND OTHER CONSTRUCTION ACTIVITIES NOT SPECIFICALLY ADDRESSED IN THE TRAFFIC CONTROL PLANS SHALL ADHERE TO THE STANDARD TRAFFIC CONTROL PLANS HEREIN.

ACCESS TO DRIVEWAYS ADJACENT TO THE CONSTRUCTION WORK ZONE SHALL BE MAINTAINED AT ALL TIMES AS MUCH AS POSSIBLE. ADDITIONAL CONES AND/OR DELINEATORS MAY BE REQUIRED TO DELINEATE THE DRIVEWAY ACCESS ROUTE THROUGH THE CONSTRUCTION WORK ZONE. A MINIMUM OF ONE TRAVEL LANE SHALL BE MAINTAINED ACROSS THE DRIVEWAYS, UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM CITY OF HOUSTON PROJECT MANAGER.

THE CONTRACTOR SHALL RESTORE OVERNIGHT 3:1 SLOPE AT DROP OFFS MORE THAN 2-INCHES.

CONTRACTOR SHALL COVER OPEN PAVEMENT EXCAVATIONS FOR MINOR UTILITY WORK WITH ANCHORED STEEL PLATES DURING NON-WORKING HOURS, AND OPEN LANES FOR NORMAL TRAFFIC FLOW WHEN FEASIBLE.

THE CONTRACTOR SHALL PROVIDE ALL ADVANCE WARNING SIGNS PER TXDOT STANDARD BC(1-2)-14 FOR THE PROJECT LIMITS.

PROVIDE ADDITIONAL SIGNS AND BARRICADES AS DIRECTED TO MAINTAIN TRAFFIC SAFETY DURING CONSTRUCTION. CONSIDER THIS WORK SUBSIDIARY TO ITEM 502 "BARRICADES, SIGNS, AND TRAFFIC HANDLING."

REMOVAL OF EXISTING ITEMS SHALL BE DONE ONLY IN AREAS WHERE WORK IS OCCURING AS NOTED IN THE SEQUENCE OF CONSTRUCTION AND/OR SHOWN IN THE TCP PLANS.

UNLESS NOTED OTHERWISE IN THE PLANS, BARRIER PLACEMENT FOR MAJOR TRAFFIC SHIFTS IS ONLY TO OCCUR DURING OFF-PEAK HOURS (AS DEFINED IN THE GENERAL NOTES.)

INSTALL ALL SWP3 MEASURES NECESSARY AT THE BEGINNING OF EACH PHASE OF CONSTRUCTION. REFER TO THE SWP3 PLAN SHEETS.

WHEN TEMPORARY SIGNS ARE REQUIRED TO MAINTAIN TRAFFIC, CONFLICTING PERMANENT SIGNS WILL BE REMOVED OR COVERED PRIOR TO IMPLEMENTATION OF THE TRAFFIC PHASE.

ALL TRAFFIC CONTROL MEASURES AND DEVICES REQUIRED FOR CONSTRUCTION OF THIS RELOCATION MUST CONFORM TO THE TECHNICAL PROVISIONS AND 2011 EDITION, REVISION 2 OCTOBER 2014, OF THE TMUTCD.

COMPLETELY REMOVE ALL PAVEMENT MARKINGS IN CONFLICT WITH THE TEMPORARY PAVEMENT MARKINGS SHOWN IN THESE PLANS. PAVEMENT MARKING REMOVAL BY OVER-PAINTING IS PROHIBITED.

THE CONTRACTOR SHALL REPLACE ANY PERMANENT PAVEMENT MARKINGS THAT ARE REMOVED DURING ALL PHASES OF CONSTRUCTION.

ENSURE ADEQUATE DRAINAGE DURING ALL PHASES OF CONSTRUCTION. SLOTTED TEMPORARY CONCRETE BARRIERS SHALL BE USED WHERE PAVEMENT SLOPES TOWARD TEMPORARY BARRIER. TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.

THE CONTRACTOR SHALL COORDINATE WITH TXDOT AND CITY OF HOUSTON FOR SIGNAL REVISIONS AS NECESSARY.

THE CONTRACTOR SHALL COORDINATE WITH ADJACENT PROJECTS AS NECESSARY.

THE MINIMUM LANE WIDTH DURING CONSTRUCTION SHALL BE 10 FEET.



CONSTRUCTION MATERIAL OR EQUIPMENT SHALL NOT BE LEFT IN A POSITION THAT ENDANGERS THE TRAVELING PUBLIC. CONSTRUCTION MATERIAL EQUIPMENT SHALL BE BEHIND BARRIER OR OUTSIDE CLEAR ZONE.

THE CONTRACTOR MAY REMOVE TEMPORARY BARRIER AT THEIR DISCRETION UPON COMPLETION OF WORK WHEN NO PROTECTION OF THE CLEAR ZONE IS REQUIRED.

REMOVE ALL TEMPORARY TRAFFIC CONTROL DEVICES AS SOON AS PRACTICAL WHEN NO LONGER NEEDED OR REQUIRED. TEMPORARY TRAFFIC CONTROL SIGNS, MESSAGE BOARDS, AND ARROW BOARDS THAT ARE NO LONGER APPROPRIATE SHALL BE REMOVED OR COVERED AS SOON AS PRACTICAL.

THE CONTRACTOR SHALL COORDINATE WITH CENTERPOINT AND ENTERGY TO DE-ENERGIZE CONFLICTING OVERHEAD UTILITY LINES DURING ALL PHASES OF CONSTRUCTION.

REFER TO THE LANDSCAPING SHEETS FOR TREE PRESERVATION & TRANSPLANTING REQUIREMENTS, TREE PROTECTION REQUIREMENTS, AND LANDSCAPING GENERAL NOTES.

### PART II - CONSTRUCTION NARRATIVE

### PHASE 1

CONSTRUCT THE PROPOSED STORM SEWER. CONSTRUCT THE EASTBOUND LANES ANE EAST OF THE UPRR. CONSTRUCT ANDERSON ROAD. KINGS MILL PARK DRIVE. AND RUSSELL PALMER ROAD.

### PHASE 1 STEP 1

CONSTRUCT STORM SEWER FROM EAST OF IH-69 TO EAST OF UPRR. CONSTRUCT STORM SEWER FROM NORTHPARK STA 42+50 TO KINGWOOD DIVERSION CHANNEL. CONNECT EXISTING LATERALS TO NEW STORM SEWER. CONSTRUCT THE WESTBOUND DETOUR WITH TEMPORARY ASPHALT. CONSTRUCT THE WESTBOUND DETOUR TEMPORARY DRAINAGE INCLUDING A TEMPORARY SWALE, TEMPORARY INLETS, AND TEMPORARY RCP. CONSTRUCT TEMPORARY PAVEMENT ON ANDERSON ROAD.

# PHASE 1 STEP 2

INSTALL TEMPORARY STRIPING ON THE WESTBOUND DETOUR AND SHIFT TRAFFIC. CONSTRUCT REMAINING STORM SEWER UNDER EXISTING WESTBOUND LANES. REMOVE EXISTING CURB AND INSTALL LOW PROFILE CONCRETE BARRIER ALONG THE EXISTING EASTBOUND LANES CONSTRUCT PROPOSED DRAINAGE. CONSTRUCT EASTBOUND LANES INSIDE THE EXISTING NORTHPARK DRIVE MEDIAN WITH PERMANENT AND TEMPORARY PAVEMENT. DO NOT CONSTRUCT PROPOSED MEDIAN CURBS. ADD TEMPORARY PAVEMENT AT EACH TURNAROUND TO TRANSITION BETWEEN EXISTING PAVEMENT AND NEW PAVEME TO ALLOW TURNAROUNDS. CONSTRUCT TEMPORARY ASPHALT TIE-INS AT NORTHPARK STA 78+50 CONSTRUCT PERMANENT AND TEMPORARY PAVEMENT AT ANDERSON ROAD. CONSTRUCT FAST TRACK CONCRETE AT RUSSELL PALMER ROAD. THIS WORK SHOULD BE CONSIDERED WEEKEND WORK. IMPLEMENT THE RUSSELL PALMER DETOUR.

# PHASE 1 STEP 3

INSTALL TEMPORARY STRIPING AND LOW PROFILE CONCRETE BARRIER ON NEWLY CONSTRUCTED EASTBOUND LANES AND SHIFT EASTBOUND TRAFFIC. CONSTRUCT PROPOSED DRAINAGE. CONSTRUCT OUTER EASTBOUND LANES AND EBFR EAST OF ANDERSON ROAD. MAINTAIN ACCESS TO ALL DRIVEWAYS AT ALL TIMES. ADJUST BARRIER AND CHANNELING DEVICES AS NECESSARY DURING PHASED CONSTRUCTION. CONSTRUCT REMAINING PERMANENT PAVEMENT AT ANDERSON ROAD. INSTALL TEMPORARY STRIPING AT KINGS MILL PARK DRIVE. CONSTRUCT PERMANENT PAVEMENT AT NORTHBOUND KINGS MILL PARK DRIVE. INSTALL TEMPORARY STRIPING AT RUSSELL PALMER ROAD. CONSTRUCT FAST TRACK CONCRETE PAVEMENT AT RUSSELL PALMER ROAD, THIS WORK SHOULD BE CONSIDERED WEEKEND WORK.

# PHASE 1 STEP 4

INSTALL TEMPORARY STRIPING ON ANDERSON ROAD. INSTALL TEMPORARY STRIPING ON KINGS MILL PARK DRIVE AND SHIFT TRAFFIC TO NORTHBOUND LANE. CONSTRUCT PROPOSED DRAINAGE AT KINGS MILL PARK DRIVE. CONSTRUCTION PERMANENT PAVEMENT AT SOUTHBOUND KINGS MILL PARK DRIVE. INSTALL TEMPORARY STRIPING ON RUSSELL PALMER DRIVE. CONSTRUCT FAST TRACK CONCRETE PAVEMENT AT RUSSELL PALMER ROAD. THIS WORK SHOULD BE CONSIDERED WEEKEND WORK.

### PHASE 2

CONSTRUCT LOOP 494, REMAINING EBFR, WBFR, AND OUTSIDE LANES OF NORTHPARK DRIVE BETWEEN IH-69 AND LOOP 494.

# PHASE 2 STEP 1

INSTALL TEMPORARY STRIPING AND SHIFT TRAFFIC FROM NORTHPARK DRIVE TO PAVEMENT CONSTRUCTED IN PHASE 1 CONSTRUCT PROPOSED DRAINAGE CONSTRUCT WESTBOUND NORTHPARK LANES AND WBFR. MAINTAIN ACCESS TO ALL DRIVEWAYS AT ALL TIMES. ADJUST BARRIER AND CHANNELING DEVICES AS NECESSARY DURING PHASED CONSTRUCTION. CONSTRUCT TEMPORARY PAVEMENT WIDENING ON THE WEST SIDE OF LOOP 494.

# PHASE 2 STEP 2

INSTALL TEMPORARY STRIPING ON LOOP 494 AND SHIFT TRAFFIC TO TEMPORARY PAVEMENT CONSTRUCTED IN PHASE 2 STEP 1. CONSTRUCT PROPOSED DRAINAGE ALONG LOOP 494. CONSTRUCT FAST TRACK CONCRETE PAVEMENT AT LOOP 494. THIS WORK SHOULD BE CONSIDERED WEEKEND WORK. CONSTRUCT WESTERN HALF OF LOOP 494 AND ASPHALT TIE-INS.

# PHASE 2 STEP 3

INSTALL TEMPORARY STRIPING ON LOOP 494 AND SHIFT TRAFFIC. REMOVE TEMPORARY PAVEMENT ON LOOP 494 CONSTRUCTED IN PHASE 2 STEP 1 CONSTRUCT PROPOSED DRAINAGE ALONG LOOP 494. CONSTRUCT FAST TRACK CONCRETE PAVEMENT AT LOOP 494. THIS WORK SHOULD BE CONSIDERED WEEKEND WORK. CONSTRUCT EASTERN HALF OF LOOP 494 AND ASPHALT TIE-INS. CONSTRUCT PROPOSED DRAINAGE ALONG NORTHPARK DRIVE. CONSTRUCT PROPOSED POND EQUALIZER PIPE UNDER NORTHPARK DRIVE AND ALONG NBFR. TEMPORARILY CLOSE BOTH TURN LANES ON THE NBFR AT NORTHPARK DRIVE. CONSTRUCT OUTER NORTHPARK LANES WITH FAST TRACK CONCRETE, PERMANENT PAVEMENT, AND TEMPORARY PAVEMENT.

REOPEN THE TURNLANES ON THE NBFR WHEN FAST TRACK CONRETE IS COMPLETE.

### PHASE 3

CONSTRUCT NORTHPARK DRIVE OVERPASS AND REMAINING LOOP 494 PAVEMENT.

### PHASE 3 STEP 1

INSTALL TEMPORARY STRIPING AND SHIFT TRAFFIC ON NORTHPARK DRIVE TO THE FRONTAGE ROADS AND OUTSIDE PAVEMENT CONSTRUCTED IN PHASE 2.

INSTALL TEMPORARY STRIPING ON LOOP 494 PAVEMENT CONSTRUCTED IN PHASE 2. CLOSE THE INSIDE LANES OF NORTHPARK DRIVE EAST OF THE UPRR TO ALLOW FOR REMAINING CONSTRUCTION OF MEDIAN, CONCRETE PAVEMENT, AND PROPOSED POND EQUALIZER PIPE. CLOSE LOOP 494 THROUGH TRAFFIC AND IMPLEMENT LOOP 494 DETOUR CONSTRUCT REMAINING LOOP 494 PAVEMENT UNDER NORTHPARK DRIVE OVERPASS WITH FAST TRACK CONCRETE. THIS WORK SHOULD BE CONSIDERED WEEKEND WORK. IMPLEMENT LOOP 494 DETOUR. CONSTRUCT THE INSIDE LANES OF NORTHPARK DRIVE NEAR IH-69.

### PHASE 3 STEP 2

INSTALL TEMPORARY STRIPING ON LOOP 494 PAVEMENT CONSTRUCTED IN PHASE 3 STEP 1 INSTALL TEMPORARY STRIPING ON NORTHPARK DRIVE NEAR IH-69. REMOVE TEMPORARY PAVEMENT ON NORTHPARK DRIVE NEAR IH-69 AND CONSTRUCT PROPOSED DRAINAGE. CONSTRUCT RETAINING WALLS, BENTS, AND BRIDGE DECK OF NORTHPARK DRIVE OVERPASS CONSTRUCT TURNAROUNDS WHEN BRIDGE CONSTRUCTION IS COMPLETE. IMPLEMENT LOOP 494 DETOUR AS NECESSARY DURING OVERPASS CONSTRUCTION. COMPLETE ALL MISCELLANEOUS CONSTRUCTION. REMOVE TEMPORARY PAVEMENT, PLACE PERMANENT PAVEMENT MARKINGS, PERMANENT SIGNING, AND INSTALL LANDSCAPING. REMOVE ALL SW3P BEST MANAGEMENT PRACTICES. PERFORM FINAL CLEAN UP.





NOTES:

- NOTES: 1. SIGN SPACING SHALL ADHERE TO TXDOT STANDARD BC(2)-14. NORTHPARK DRIVE (45 MPH): 320' LOOP 494 (50 MPH): 400' IH-69 FRONTAGE ROAD (55 MPH): 500' 2. CONTRACTOR SHALL ADHERE AT ALL TIMES TO TXDOT STANDARDS BC(1)-14 THROUGH BC(12)-14 FOR SIGN DETAILS, DIMENSIONS, AND PLACEMENT. 3. CONTRACTOR SHALL MAINTAIN ACCESS TO DRIVEWAYS AT ALL TIMES 4. REFER TO "TRAFFIC CONTROL PLAN, CONSTRUCTION SIGN DETAIL" FOR MORE INFORMATION







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WITH CHEVRON SIGN @ 60' C-C AND TYPE "C" WARNING

PLASTIC DRUMS ON TANGENT @ 35' C-C WITH VERTICAL

PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @ 20'

SPACING SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED

BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS, AND/OR MEDIAN OPENINGS.

C-C WITH VERTICAL PANEL @ 40' C-C AND TYPE "A" WARNING LIGHT @ 40' C-C (FOR OVERNIGHT CLOSURE)

PANEL @ 70' C-C AND TYPE "C" WARNING LIGHT @ 70' C-C

LIGHT (FOR OVERNIGHT CLOSURE)

PLASTIC DRUMS ON RADII @ 5' C-C

(FOR OVERNIGHT CLOSURE)

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- @ 40' C/C
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- $(\bigcirc)$ SPACING SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED @ 40' C/C BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS, AND/OR MEDIAN OPENINGS. (z)PREV WRK ZN PAV MRK TO REMAIN



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- 3. REFER TO "TRAFFIC CONTROL PLAN MISCELLANEOUS DETAILS" FOR TEMPORARY PAVEMENT STRUCTURE.
- 4. DO NOT CONSTRUCT PROPOSED CURBS IN CONFLICT WITH TEMPORARY PAVEMENT UNTIL AFTER TEMPORARY PAVEMENT IS REMOVED.





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- (s) PLASTIC DRUMS ON RADII @ 5' C-C
- (T) PLASTIC DRUMS ON TANGENT @ 35' C-C WITH VERTICAL PANEL @ 70' C-C AND TYPE "C" WARNING LIGHT @ 70' C-C (FOR OVERNIGHT CLOSURE)
- $( \cup )$ PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @ 20' C-C WITH VERTICAL PANEL @ 40' C-C AND TYPE "A" WARNING LIGHT @ 40' C-C (FOR OVERNIGHT CLOSURE)

 $(\bigcirc)$ SPACING SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS, AND/OR MEDIAN OPENINGS. (z)

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C-C WITH VERTICAL PANEL @ 40' C-C AND TYPE "A"

WARNING LIGHT @ 40' C-C (FOR OVERNIGHT CLOSURE)

SPACING SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED

BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE

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- 3. REFER TO "TRAFFIC CONTROL PLAN MISCELLANEOUS DETAILS" FOR TEMPORARY PAVEMENT STRUCTURE.
- 4. DO NOT CONSTRUCT PROPOSED CURBS IN CONFLICT WITH TEMPORARY PAVEMENT UNTIL AFTER TEMPORARY PAVEMENT IS REMOVED.





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REMOV	(REFL) TY II-A-
REMOV	(W) (ARROW)
REMOV	(W) (DBL ARROW)
REMOV	(W) (WORD)
REMOV	(W)(RR XING)
REMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-
MRK T	O REMAIN





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WRK ZN PAV MRK REMOV (W) (4") (SLD) WRK ZN PAV MRK REMOV (W) (4") (BRK) WRK ZN PAV MRK REMOV (W) (4") (DOT) WRK ZN PAV MRK REMOV (W) (8") (SLD) WRK ZN PAV MRK REMOV (W) (12") (SLD) WRK ZN PAV MRK REMOV (W) (24") (SLD) WRK ZN PAV MRK REMOV (Y) (4") (SLD) WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (W) (RR XING) WRK ZN PAV MRK REMOV (REFL) TY II-C-R





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WRK ZN PAV MRK REMOV (W) (4") (SLD) WRK ZN PAV MRK REMOV (W) (4") (BRK) WRK ZN PAV MRK REMOV (W) (4") (DOT) WRK ZN PAV MRK REMOV (W) (8") (SLD) WRK ZN PAV MRK REMOV (W) (12") (SLD) WRK ZN PAV MRK REMOV (W) (24") (SLD) WRK ZN PAV MRK REMOV (Y) (4") (SLD) WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (W) (RR XING) WRK ZN PAV MRK REMOV (REFL) TY II-C-R





REMOV (W)(4")(SLD	)
REMOV (W)(4")(BRK	)
REMOV (W)(4")(DOT	)
REMOV (W)(8")(SLD	)
REMOV (W)(12")(SLD	)
REMOV (W) (24") (SLD	)
REMOV (Y)(4")(SLD	)
REMOV (Y)(24")(SL	D)
REMOV (REFL) TY I	I - A - A
REMOV (W) (ARROW)	
EMOV (W) (DBL ARRO)	N)
REMOV (W) (WORD)	
EMOV (W) (RR XING)	
EMOV (W) (UTURN)	
REMOV (REFL) TY I	I - C - R
MRK TO REMAIN	







SPACING FOR CHANNELING DEVICES:

- (R)PLASTIC DRUMS ON MERGING TAPER @ 30' C-C WITH CHEVRON SIGN @ 60' C-C AND TYPE "C" WARNING LIGHT (FOR OVERNIGHT CLOSURE)
- (s) PLASTIC DRUMS ON RADII @ 5' C-C
- (T) PLASTIC DRUMS ON TANGENT @ 35' C-C WITH VERTICAL PANEL @ 70' C-C AND TYPE "C" WARNING LIGHT @ 70' C-C (FOR OVERNIGHT CLOSURE)
- $( \cup )$ PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @ 20' C-C WITH VERTICAL PANEL @ 40' C-C AND TYPE "A" WARNING LIGHT @ 40' C-C (FOR OVERNIGHT CLOSURE)

SPACING SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE (z)DRIVEWAYS, INTERSECTIONS, AND/OR MEDIAN OPENINGS.

В (C) WRK ZN PAV MRK REMOV (W) (4") (DOT)  $\bigcirc$ (E) (F) $\bigcirc$ (н) @ 40' C/C  $(\mathbf{J})$ WRK ZN PAV MRK REMOV (W) (ARROW) (K) (L) WRK ZN PAV MRK REMOV (W) (WORD) (M) (N)WRK ZN PAV MRK REMOV (W) (UTURN)  $(\bigcirc)$ 

@ 40' C/C



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WRK ZN PAV MRK REMOV (W) (8") (SLD) WRK ZN PAV MRK REMOV (W) (12") (SLD) WRK ZN PAV MRK REMOV (W) (24") (SLD) WRK ZN PAV MRK REMOV (Y) (4") (SLD) WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (W) (RR XING) WRK ZN PAV MRK REMOV (REFL) TY II-C-R







SCALE : 1"=100"



REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y) (24") (SLD)
REMOV	(REFL) TY II-A-
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-
MRK T	O REMAIN





WRK ZN PAV MRK REMOV (W) (4") (SLD) WRK ZN PAV MRK REMOV (W) (4") (BRK) WRK ZN PAV MRK REMOV (W) (4") (DOT) WRK ZN PAV MRK REMOV (W) (8") (SLD) WRK ZN PAV MRK REMOV (W) (12") (SLD) WRK ZN PAV MRK REMOV (W) (24") (SLD) WRK ZN PAV MRK REMOV (Y) (4") (SLD) WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (W) (RR XING) WRK ZN PAV MRK REMOV (REFL) TY II-C-R



- WRK ZN PAV MRK WRK ZN PAV MRK
- WRK ZN PAV MRK
- WRK ZN PAV MRK R
- WRK ZN PAV MRK R
- WRK ZN PAV MRK
- WRK ZN PAV MRK

  - WRK ZN PAV MRK @ 40' C/C
  - WRK ZN PAV MRK R
- WRK ZN PAV MRK R
  - WRK ZN PAV MRK R
  - WRK ZN PAV MRK RI
  - WRK ZN PAV MRK R
- WRK ZN PAV MRK @ 40' C/C PREV WRK ZN PAV



# LEGEND

REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y)(24")(SLD)
REMOV	(REFL) TY II-A-A
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-F
MRK T	O REMAIN







- MISCELLANEOUS DETAILS" FOR TEMPORARY PAVEMENT STRUCTURE.
- 4. DO NOT CONSTRUCT PROPOSED CURBS IN CONFLICT WITH TEMPORARY PAVEMENT UNTIL AFTER TEMPORARY PAVEMENT IS REMOVED.





REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y) (24") (SLD)
REMOV	(REFL) TY II-A-A
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
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WRK ZN PAV MRK REMOV (W) (4") (BRK) WRK ZN PAV MRK REMOV (W) (4") (DOT) WRK ZN PAV MRK REMOV (W) (24") (SLD) WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (REFL) TY II-C-R





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- WRK ZN PAV MRK REMOV (W) (ARROW)
- WRK ZN PAV MRK REMOV (W) (WORD)

- PREV WRK ZN PAV MRK TO REMAIN



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REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y)(24")(SLD)
REMOV	(REFL) TY II-A-A
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
MRK T	O REMAIN





BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS, AND/OR MEDIAN OPENINGS.

(z)

PREV WRK ZN PAV

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NOTES:

- 1. WHEN LOW PROFILE CONCRETE BARRIER IS ADJACENT TO TRAFFIC, ALL LOW PROFILE CONCRETE BARRIER ENDS FACING APPROACHING TRAFFIC SHALL BE PROTECTED BY LOW PROFILE CONCRETE BARRIER TY 2
- 2. ACCESS TO ALL PROPERTIES AND CROSS STREETS IS TO BE MAINTAINED AT ALL TIMES. DRIVEWAY CONSTRUCTION SHALL FOLLOW HOUSTON DISTRICT CSMD TC 8010-20 AND DS TC 8020-04
- 3. REFER TO "TRAFFIC CONTROL PLAN MISCELLANEOUS DETAILS" FOR TEMPORARY PAVEMENT STRUCTURE.
- 4. DO NOT CONSTRUCT PROPOSED CURBS IN CONFLICT WITH TEMPORARY PAVEMENT UNTIL AFTER TEMPORARY PAVEMENT IS REMOVED.





REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
REMOV	(W)(12")(SLD)
REMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y)(24")(SLD)
REMOV	(REFL) TY II-A-A
REMOV	(W) (ARROW)
REMOV	(W) (DBL ARROW)
REMOV	(W) (WORD)
REMOV	(W)(RR XING)
REMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
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REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y)(24")(SLD)
REMOV	(REFL) TY II-A-A
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
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WRK ZN PAV MRK REMOV (W) (4") (BRK) WRK ZN PAV MRK REMOV (W) (4") (DOT) WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (REFL) TY II-C-R



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(A)WRK ZN PAV MRK В WRK ZN PAV MRK (C) WRK ZN PAV MRK  $\bigcirc$ WRK ZN PAV MRK (E) WRK ZN PAV MRK R SPACING FOR CHANNELING DEVICES: (F)WRK ZN PAV MRK R  $\bigcirc$ WRK ZN PAV MRK PLASTIC DRUMS ON MERGING TAPER @ 30' C-C WITH CHEVRON SIGN @ 60' C-C AND TYPE "C" WARNING (H) WRK ZN PAV MRK LIGHT (FOR OVERNIGHT CLOSURE) WRK ZN PAV MRK PLASTIC DRUMS ON RADII @ 5' C-C @ 40' C/C  $(\mathbf{J})$ WRK ZN PAV MRK R PLASTIC DRUMS ON TANGENT @ 35' C-C WITH VERTICAL (K) PANEL @ 70' C-C AND TYPE "C" WARNING LIGHT @ 70' C-C WRK ZN PAV MRK R (FOR OVERNIGHT CLOSURE) (L) WRK ZN PAV MRK R PLASTIC DRUMS IN FRONT OF CONSTRUCTION ZONE @ 20' (M) WRK ZN PAV MRK R C-C WITH VERTICAL PANEL @ 40' C-C AND TYPE "A" WARNING LIGHT @ 40' C-C (FOR OVERNIGHT CLOSURE) (N)WRK ZN PAV MRK R WRK 7N PAV MRK  $(\bigcirc)$ SPACING SHOWN ON TRAFFIC CONTROL PLANS SHALL BE SUPERSEDED @ 40′ C/C BY THE ABOVE SPACINGS. SPACINGS MAY BE ADJUSTED TO PROVIDE DRIVEWAYS, INTERSECTIONS, AND/OR MEDIAN OPENINGS. (z)PREV WRK ZN PAV







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REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y)(24")(SLD)
REMOV	(REFL) TY II-A-A
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
MRK T	O REMAIN











REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y)(24")(SLD)
REMOV	(REFL) TY II-A-A
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
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- WRK ZN PAV MRK R
- WRK ZN PAV MRK R

- WRK ZN PAV MRK R

WRK ZN PAV MRK



4. DO NOT CONSTRUCT PROPOSED CURBS IN CONFLICT WITH TEMPORARY PAVEMENT UNTIL AFTER TEMPORARY PAVEMENT IS REMOVED.





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REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y) (24") (SLD)
REMOV	(REFL) TY II-A-A
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
MRK T	O REMAIN









REMOV (W	)(4")(SLD)
REMOV (W	)(4")(BRK)
REMOV (W	)(4")(DOT)
REMOV (W	)(8")(SLD)
EMOV (W)	(12") (SLD)
EMOV (W)	(24") (SLD)
REMOV (Y	)(4")(SLD)
REMOV (Y	)(24")(SLD)
REMOV (R	EFL) TY II-A-A
EMOV (W)	(ARROW)
EMOV (W)	(DBL ARROW)
EMOV (W)	(WORD)
EMOV (W)	(RR XING)
EMOV (W)	(UTURN)
REMOV (R	EFL) TY II-C-R
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WRK ZN PAV MRK REMOV (W) (4") (BRK) WRK ZN PAV MRK REMOV (W) (4") (DOT) WRK ZN PAV MRK REMOV (W) (24") (SLD) WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (REFL) TY II-C-R







END	
REMOV (	W)(4")(SLD)
REMOV (	W)(4")(BRK)
REMOV (	W)(4")(DOT)
REMOV (	W)(8")(SLD)
EMOV (W	)(12")(SLD)
EMOV (W	)(24")(SLD)
REMOV (	Y)(4")(SLD)
REMOV (	Y)(24")(SLD)
REMOV (	REFL) TY II-A-A
EMOV (W	) (ARROW)
EMOV (W	)(DBL ARROW)
EMOV (W	) (WORD)
EMOV (W	)(RR XING)
EMOV (W	) (UTURN)
REMOV (	REFL) TY II-C-R
MRK TO	REMAIN











4. DO NOT CONSTRUCT PROPOSED CURBS IN CONFLICT WITH TEMPORARY PAVEMENT UNTIL AFTER TEMPORARY PAVEMENT IS REMOVED.





REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
REMOV	(W)(12")(SLD)
REMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y) (24") (SLD)
REMOV	(REFL) TY II-A-A
REMOV	(W) (ARROW)
REMOV	(W) (DBL ARROW)
REMOV	(W) (WORD)
REMOV	(W)(RR XING)
REMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
MRK T	O REMAIN





END	
REMOV	W)(4")(SLD)
REMOV	W)(4")(BRK)
REMOV	W)(4")(DOT)
REMOV	W)(8")(SLD)
EMOV (V	W)(12")(SLD)
EMOV (V	V)(24")(SLD)
REMOV	(4") (SLD)
REMOV	Y)(24")(SLD)
REMOV	REFL) TY II-A-A
EMOV (V	(ARROW)
EMOV (V	W) (DBL ARROW)
EMOV (V	(WORD)
EMOV (V	W) (RR XING)
EMOV (V	(UTURN)
REMOV	REFL) TY II-C-R
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REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
REMOV	(W)(12")(SLD)
REMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y)(24")(SLD)
REMOV	(REFL) TY II-A-
REMOV	(W) (ARROW)
REMOV	(W) (DBL ARROW)
REMOV	(W) (WORD)
REMOV	(W)(RR XING)
REMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-
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REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
EMOV	(W)(12")(SLD)
EMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y)(24")(SLD)
REMOV	(REFL) TY II-A-A
EMOV	(W) (ARROW)
EMOV	(W) (DBL ARROW)
EMOV	(W) (WORD)
EMOV	(W)(RR XING)
EMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-R
MRK T	O REMAIN

















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REMOV	(W)(4")(SLD)
REMOV	(W)(4")(BRK)
REMOV	(W)(4")(DOT)
REMOV	(W)(8")(SLD)
REMOV	(W)(12")(SLD)
REMOV	(W)(24")(SLD)
REMOV	(Y)(4")(SLD)
REMOV	(Y) (24") (SLD)
REMOV	(REFL) TY II-A-
REMOV	(W) (ARROW)
REMOV	(W) (DBL ARROW)
REMOV	(W) (WORD)
REMOV	(W)(RR XING)
REMOV	(W) (UTURN)
REMOV	(REFL) TY II-C-
MRK T	O REMAIN







2.10				
REMOV (W)	(4")(SLD)			
REMOV (W)	(4") (BRK)			
REMOV (W)	(4") (DOT)			
REMOV (W)	(8")(SLD)			
EMOV (W)	12")(SLD)			
EMOV (W)	24") (SLD)			
REMOV (Y)	(4") (SLD)			
REMOV (Y)	(24") (SLD)			
REMOV (RE	FL) TY II-A-A			
EMOV (W)	ARROW)			
EMOV (W)	DBL ARROW)			
EMOV (W)	WORD)			
EMOV (W)	RR XING)			
EMOV (W)	UTURN)			
REMOV (RE	FL) TY II-C-R			
MRK TO REMAIN				







WRK ZN PAV MRK REMOV (W) (4") (BRK) WRK ZN PAV MRK REMOV (W) (4") (DOT) WRK ZN PAV MRK REMOV (W) (24") (SLD) WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (REFL) TY II-C-R







4. DO NOT CONSTRUCT PROPOSED CURBS IN CONFLICT WITH TEMPORARY PAVEMENT UNTIL AFTER TEMPORARY PAVEMENT IS REMOVED.





# LEGEND

REMOV	(W)(4")(SLD)			
REMOV	(W)(4")(BRK)			
REMOV	(W)(4")(DOT)			
REMOV	(W)(8")(SLD)			
EMOV	(W)(12")(SLD)			
EMOV	(W)(24")(SLD)			
REMOV	(Y)(4")(SLD)			
REMOV	(Y) (24") (SLD)			
REMOV	(REFL) TY II-A-A			
EMOV	(W) (ARROW)			
EMOV	(W) (DBL ARROW)			
EMOV	(W) (WORD)			
EMOV	(W)(RR XING)			
EMOV	(W) (UTURN)			
REMOV	(REFL) TY II-C-R			
MRK TO REMAIN				





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WRK ZN PAV MRK REMOV (Y) (24") (SLD) WRK ZN PAV MRK REMOV (REFL) TY II-A-A WRK ZN PAV MRK REMOV (W) (DBL ARROW) WRK ZN PAV MRK REMOV (REFL) TY II-C-R







END			
REMOV	(W)(4")(SLD)		
REMOV	(W)(4")(BRK)		
REMOV	(W)(4")(DOT)		
REMOV	(W)(8")(SLD)		
EMOV	(W)(12")(SLD)		
EMOV	(W)(24")(SLD)		
REMOV	(Y)(4")(SLD)		
REMOV	(Y) (24") (SLD)		
REMOV	(REFL) TY II-A-A		
EMOV	(W) (ARROW)		
EMOV	(W) (DBL ARROW)		
EMOV	(W) (WORD)		
EMOV	(W)(RR XING)		
EMOV	(W) (UTURN)		
REMOV	(REFL) TY II-C-R		
MRK TO REMAIN			



### <u>B</u> WB DETOUR

Beginning chain WB_DETOUR descript	ion				
	Curve	Data			
Curve   WB_DETOUR1   100+99.80     P.I.   Station   100'99.80     Delta   =   14° 07' 02.81     Degree   =   7° 06' 31.17"     Tangent   =   99.8030     Length   =   198.5951     Radius   =   806.0000     External   =   6.1556	* N (LT)	* 10,025,826.2348 E	3,907,251.0627		
Long Chord = 198.0931 Mid. Ord. = 6.1089 P.C. Station 100+00.00 P.T. Station 101+98.60 C.C. Back = N 87° 06′ 33.33" E Ahead = N 72° 59′ 30.52" E Chord Bear = N 80° 03′ 01.93" E	N N N	10,025,821.2016 E 10,025,855.4280 E 10,026,626.1759 E	3,907,151.3867 3,907,346.5006 3,907,110.7389		
Course from PT WB_DETOUR1 to PC WB.	DETOU	R2 N 72° 59′ 30.53" E D	ist 8.0778		
	Curve *	Data *			
Curve with Deltowrage 103+34.91   P.I. Station 103+34.91   Delta 13° 53' 59.10"   Degree 5° 26' 46.92"   Tangent 128.2353   Length 255.2114   Radius 1,052.0000   External 7.7869	N (RT)	10,025,895.3007 E	3,907,476.8517		
Long Chord = 254.5861 Mid. Ord. = 7.7297 P.C. Station 102+06.67 P.T. Station 104+61.88 C.C. Back = N 72° 59' 30.52" E Ahead = N 86° 53' 29.63" E Chord Bear = N 79° 56' 30.07" E	N N N	10,025,857.7908 E 10,025,902.2544 E 10,024,851.8022 E	3,907,354,2251 3,907,604,8983 3,907,661,9439		
Course from PT WB_DETOUR2 to PC WB.	_DE TOUI	R3 N 86° 53′ 29.63" E D	ist 550.6081		
	Curve	Data *			
Curve WB_DETOUR3 P.I. Station 111+11.81 Delta = 10° 47′ 11.71" Degree = 5° 26′ 46.92" Tangent = 99.3190 Length = 198.0510 Radius = 1,052.0000 External = 4.6779 Long Chord = 197.7587	N (RT)	10,025,937.4972 E	3, 908, 253. 8692		
	N N N	10,025,932.1116 E 10,025,924.2274 E 10,024,881.6594 E	3,908,154.6963 3,908,352.2978 3,908,211.7419		
Course from PT WB_DETOUR3 to PC WB.	_DE TOUI	R4 S 82° 19′ 18.67" E D	ist 17.3858		
	Curve *	Data *			
Curve WB_DETOUR4   P.I. Station 113+14.03   Delta = 10° 47′ 11.71"   Degree = 6° 16′ 56.76"   Tangent = 86.1017   Length = 171.6944   Radius = 912.0000   External = 4.0554   Long Chord = 171.4410	N (LT)	10,025,910.4006 E	3,908,454.8574		
Mid. Ord. = 4.0374   P.C. Station 112+27.93   P.T. Station 113+99.62   C.C. Back = 82° 19' 18.67" E   Ahead = N 86° 53' 29.62" E	N N N	10,025,921.9045 E 10,025,915.0695 E 10,026,825.7277 E	3,908,369.5277 3,908,540.8324 3,908,491.3784		
unora bear = 5 87 42 54.52 E Course from PT WB DETOUR4 to DET1004 N 86° 53′ 29.62" E Dist 50.0000					
Point DET1004 N 10,025,91	7.7808	E 3,908,590.7588 Std	114+49.62		
Ending chain $WB_DETOUR$ description					

### <u>B</u>RUSSEL PALMER

Beginning chain RUSSEL	_L_F	PALMER description				
D		10 005 500 7071 5	2 011 270 400C C+-			
POINT RPI003	N	10,025,598.7871 E	3,911,378.4906 510			
Course from RP1003 to	RP	1004 N 3° 21' 12.83"	W Dist 430.0000			
Point RP1004	Ν	10,026,028.0507 E	3,911,353.3368 Sta			
Ending chain RUSSELL_PALMER description						

100+00.00

104+30.00



4/5/21





















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## LEGEND

	WORK ZONE
•	CONSTRUCTION WARNING SIGN
Π	TY III BARRICADE
-	PROPOSED TRAVEL FLOW
	DETOUR PATH

### NOTES:

- 1. DETOURS ARE FOR OFF-PEAK CLOSURES ONLY.
- 2. REFER TO TRAFFIC CONTROL PLAN CONSTRUCTION DETOUR DIAGRAM LEGEND



NOT TO SCALE



2220



### LEGEND

6	

	WORK ZONE
•	CONSTRUCTION WARNING SIGN
Η	TY III BARRICADE
-	PROPOSED TRAVEL FLOW
·	DETOUR PATH

### NOTES:

- 1. DETOURS ARE FOR OFF-PEAK CLOSURES ONLY.
- 2. REFER TO TRAFFIC CONTROL PLAN CONSTRUCTION DETOUR DIAGRAM LEGEND



NOT TO SCALE







### 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 Manualon 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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- 11. Except for devices required by Note 10, 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 travellanes. 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 APPAREL 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.



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

Merk: e use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any made by TXOOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion standard to ather formats or for incorrect results or damages resulting from its use.

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DATE:

	TYPICAL CONS	TRUCTION WAR	RNING SIGN S	IZE AND	) SPACII	NG <sup>1,5,6</sup>		
		SIZE		r	SPA	CING		
	Sign Number or Series	Conventional Road	Expressway/ Freeway		Posted Speed	∆ Sign Spacing "X"		
	CW20 <sup>4</sup> CW21			1	MPH 30	Feet (Apprx.) 120		
	CW22 CW23 CW25	48" x 48"	48'' × 48''		35 40	160 240		
	CW1, CW2, CW7, CW8, CW9, CW11, CW14	36'' x 36'' 48'	× 48''		45 50 55 60	320 400 500 <sup>2</sup>		
	CW3, CW4, CW5, CW6,	48" x 48" 48	' x 48''		65 70 75	700 <sup>2</sup> 800 <sup>2</sup>		
	CW8-3, CW10, CW12				80	1000 <sup>2</sup>		
	<ul> <li>★ For typical sign spaces Part 6 of the (TMUTCD) typical of TMUTCD) typical of work area and/or</li> </ul>	icings on divided high "Texas Manualon Un pplication diagrams of from work area to distance between ea	iways, expressways iform Traffic Cont r TCP Standard Sh first Advance Warn ch additionalsign.	and freew rolDevices eets. ing sign ne	ays, " earest the			
	GENERAL NOTES	signs may be used	as necessary.					
	2. Distance between si advance warning.	gns should be increa	sed as required to	have 1500	) feet			
	3. Distance between si or more advance	gns should be increa warning.	sed as required to	have 1/2	2 mile			
Y VG LAW	<ul> <li>4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical Location of Crossroad Signs".</li> <li>5. Only diamond shaped warning sign sizes are indicated.</li> <li>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.</li> </ul>							
<u>4</u>			LEGE	ND				
-			Type 3 Bo	irricade a Device	s			
		-	Sign	<b>,</b>	-			
stance	AD	x	See Typico Warning Si Spacing ch TMUTCD fo spacing re	al Constru gn Size lart or th or sign quiremen	uction and ne ts.			
ific pr unded Engin	oject. Deer	®			SHEE	T 2 OF 12 Traffic		
RK ZC	NE" (G20-26T)	Texas De	partment of Tra	ansporta	ntion	Operations Division Standard		
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### 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

- 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)
- 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

- 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 around. 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 payed 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
- "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
- 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 r 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 or Type GL , 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
   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.
- 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. Burlon 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.

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 ControlDevice List" (CWZTCD). The Contractor

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

support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.

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"

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### 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 avail-
- able 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	WORD OR PHRASE	ABBREVIATION
Access Road A	CCS RD	Major MAJ	
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Nor thbound	(route) N
Construction	CONST AHD	Parking	PKING
	VINO	Road	RD
CRUSSING		Right Lane	RTLN
Detour Route	DETOUR RIE	Saturday	SAT
DO NOT		Service Road	SERV RD
Edst	E (as ta) E	Shoulder	SHLDR
Eastbound	(FOUTE) E	Slippery	SLIP
Emergency	EMER VEH	South	S
Emergency vehicle	EMER VEH	Southbound	(route) S
Entrance, Enter		Speed	SPD
		Street	ST
Expresswdy	EXPWI	Sunday	SUN
XXXX Feet		Telephone	PHONE
	FOG AHD	Temporary	TEMP
Freeway	FRWY, FWY	Thursday	THURS
Freeway Blocked	FWY BLKD	To Downtown	TO DWINTN
Friday	FRI	Traffic	TRAF
Hazardous Driving	HAZ DRIVING	Travelers	TRVLRS
Hazardous Material	HAZMAI	Tuesday	TUES
High-Occupancy	HOV	Time Minutes	TIME MIN
Vehicle	HWY	Upper Level	UPR LEVEL
Highway		Vehicles (s)	VEH, VEHS
Hour (s)	HR, HRS	Warning	WARN
Information	INFO	Wednesday	WED
	115	Weight Limit	WT LIMIT
Junction	JUI	West	W
Left		Westbound	(route) W
Left Lane		Wet Pavement	WET PVMT
Lane Closed	LN CLOSED	Will Not	WONT
Lower Level	LWR LEVEL		
Maintenance	MAINT		

RECOMMENDED	PHASES	AND	FORMATS	FOR	PCMS	MESSAGES	DUf

ROAD

REPAIRS

XXXX FT

(The Engineer may approve other messages not specifically covered here.)

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

R	oad/Lane/Ram	p Closure List	Other Conc	lition List
	FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	F RE XX
	ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	L NA XX
	ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	T W TR XX
	RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	C TR XX
	CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UN L XX
	NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	R F XX
	VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	RO/ N FR
	EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US E X
	MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LS
	XXXXXXXX BLVD CLOSED	* LANES SHIFT in	Phose 1 must be used with STAY	IN LANE in

### GGER LANE X FT NARROWS XXXX FT T LN TWO-WAY ROWS TRAFFIC (X FT XX MILE GING CONST **FFIC** TRAFFIC (X FT XXX FT OSE UNEVEN AVEL LANES XXXX FT X FT TOUR ROUGH VILE ROAD XXXX FT DWORK ROADWORK AST NFXT FRI-SUN XXXX IMP US XXX X FT EXIT X MILES FFIC LANES SHIFT NAL

ed with STAY IN LANE in Phase 2.

### 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.

### appropriate. 3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can

WORDING ALTERNATIVES

Action to Take/Effect on Travel

MERGE

DETOUR

NEXT

X EXITS

USE

EXIT XXX

STAY ON

US XXX

SOUTH

TRUCKS

USE

US XXX N

WATCH

FOR

TRUCKS

EXPECT

DELAYS

REDUCE

SPEED

XXX FT

USE

OTHER

ROUTES

STAY IN

LANE

RIGHT

List

FORM

X LINES

RIGHT

USE

XXXXX

RD EXIT

USE EXIT

I-XX

NORTH

USE

I-XX F

TO I-XX N

WATCH

FOR

TRUCKS

EXPECT

DELAYS

PREPARE

ΤO

STOP

END

SHOULDER

USE

WATCH

FOR

WORKERS

- 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

Roadway

### designation • IH-number, US-number, SH-number, FM-number

# RING ROADWORK ACTIVITIES

## Phase 2: Possible Component Lists



\* \* See Application Guidelines Note 6.

TONIGHT

XX PM-

XX AM

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

						SHE	ET 6	OF	12
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	BAR	RICADE AN PORTABLE MESSAGE	id ( E ci Sig	COI HAI SN	NSTR NGEA (PCN	U( BL (S	CTI .E )	NC	
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ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL

				SHEET	7 OF 12			
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### GENERAL NOTES

- 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.
- 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).
- 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.
- 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.
- 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 shallhave 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.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
   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

- 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 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 povement surface may not exceed 12 inches.
- 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.
- 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.





### DIRECTION INDICATOR BARRICADE

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



### DETECTABLE PEDESTRIAN BARRICADES

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

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	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 Engineer12" 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							
d e 3 r	<ol> <li>Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.</li> <li>Chevrons and other work zone signs with an orange background shall be manufactured with Type B or Type C Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.</li> </ol>							
	<ul> <li>3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.</li> <li>4. Other sign messages (text or symbolic) may be used as</li> </ul>							
	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 shallbe 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							
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1. The chevron shall be a vertical rectangle with a 12" minimum size of 12 by 18 inches. 2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway. 3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need. 4. To be effective, the chevron should be visible for at least 500 feet. 5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300. 6. For Long Term Stationary use on tapers or Fixed Base w/ Approved Adhesive transitions on freeways and divided highways (Driveable Base, or Flexible Support can be used) self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums. **CHEVRONS** ' 9 Q 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 travellanes. 6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed near the top of the LCD along the full length of the device. WATER BALLASTED SYSTEMS USED AS BARRIERS 1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier applicat 2. Water ballosted 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 f the unit shall not be less than 32 inches in height. HOLLOW OR WATER BALLASTED SYSTEMS USED AS

LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

### GENERAL NOTES

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

Posted Speed	Formula	Minimum Desirable Taper Lengths * *			Suggested Maximum Spacing of Channelizing Devices		
×		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
30	2	150'	165'	180'	30'	60'	
35	$L = \frac{WS^2}{60}$	205'	225'	245'	35'	70'	
40	60	265'	295'	320'	40'	80'	
45		450'	495'	540'	45'	90'	
50		500'	550'	600'	50'	100'	
55	I ∎WS	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)





# CHANNELIZING DEVICES

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## WORK ZONE PAVEMENT MARKINGS

### GENERAL

- 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.
- 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.
- 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).
- 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.
- 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.
- 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.
- 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

- 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.
- 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.
- 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.



- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

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BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS									
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	LEGEND
~~~~~	Type 3 Barricade
• • •	Channelizing Devices
<b>E</b>	Trailer Mounted Flashing Arrow Board
<b>_</b>	Sign
~ ^ ^ ^ ^	Safety glare screen

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

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

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

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				DMS-8240		
RY	(REMOVABLE) PREFAB	RICATED PAVEN	MENT MARKINGS	DMS-8241		
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2	USAGE	SHE	ETING MATE			
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S ( d re on n dvise	(CW8-11) signs shall be in epeated every mile. Sign nay be supplemented wi ory Speed (CW13-1P) pla	stalled in advanc s installed along h the NEXT XX que.	ce of the the uneven MILES (CW7-3aP)			
_INE tand are niles s sl	(CW8-12) signs and ter lard shall be installed if obscured or obliterated s where the center line hall remain in place until	nporary paveme yellow centerline: 1. Repeat NO CEN markings are no permanent paven	nt markings as per s separating two NTER LINE signs t in place. The signs nent markings are	the s		
spo	aced at the distances re	commended as	per BC standards.			
s m ace o Ite	nay be required as direc until final surface is appl em 502 "BARRICADES, S	ted by the Engi ied. Signs shall b SIGNS AND TRAF	neer. Signs shall e considered FIC HANDLING.''			
fab nd/a	pricated and mounted or or listed on the "Compli	i supports as sh ant Work Zone T	own on the BC Traffic ControlDevic	es"		
nark	kings shall not be used to	o simulate edge	lines.			
be d rd H	constructed in accordan Highway Sign Designs for	ce with the deta Texas," latest	ils found in edition.			
	Т	ABLE 1				
	Edge Height (D)		* Warning D	evices		
	Less than or equ 1 <sup>1</sup> /4" (maximum-p 1 <sup>1</sup> /2" (typical-ove	ual to: laning) rlay)	Sign: C	W8-11		
7	Distance "D" ma operations and 2 lanes with edge after work opera	y be a maximu 2" for overlay condition 1 are ations cease.	um of 11/4 " for operations if unev open to traffic	planing ren		
, D	. Less than or equ	ualto 3"	Sign: CW8-11			
nt	Distance "D" ma with edge condit work operations open to traffic	y be a maximu ion 2 or 3 are cease. Uneven when "D" is gra	um of 3" if uneve open to traffic lanes should not eater than 3".	n lanes after be		
			0		Traffic	
RIN NG	OPERATIONS	Texas	Department of	Transportation	Operations Division Standard	
ĸE	in the plans.		SIGNIN	G FOR		
١G	SIGN SIZE		UNEVEN	LANES		
	א "סכ א "סכ		. –			

	WZ	(UI	<b>L)</b>	-13			
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8-95 2-98	7-13	DIST		COUNTY			SHEET NO.
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112							

48" x 48"



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LEGEND						
<u>~~~~</u>	Type 3 Barricade					
4	Sign					

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

\* Conventional Roads Only

### GENERAL NOTES

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

Те	✦ <sup>®</sup> exas Department o	of Tra	nsp	ortation		Ti Ope Di Sta	raffic prations vision andard
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	VV Z	יחי		//- IJ	)		
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DATE:

	LEGEN	٧D	
<u>e 7 7 7 2</u>	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle	K	Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
-	Sign	2	Traffic Flow
$\Diamond$	Flag	٩	Flagger

Posted Speed	Formula	D Тар	Minimum esirable er Lengt x x	hs	Suggested Spacing Channeli Devi	Maximum g of zing ces	Minimum Sign Spacing "Y"	Suggested Longitudinal Buffer Space
×		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"
30	2	150'	165'	180'	30'	60'	120'	90'
35	$L = \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'
40	80	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55	ws	550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	4 10'
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 Toper(FT) W-Width of Offset(FT) S-Posted Speed(MPH)

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

SHEET 1 OF 2						
Texas Department	of Tra	nsp	ortation		T Ope Di Sta	raffic erations ivision andard
TRAFFIC S TYPICAL WZ	IGN D	NA El TS	L W [AIL\$ 5-1)-	0 5 13	RK 3	
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2-98 10-99 7-13	DIST		COUNTY			SHEET NO.
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114						





J	MMARY OI	F LARGE SIGN	S				
	SIGN	REFLECTIVE	SQ FT	GALVA STRUC ST	NIZED TURA EEL	L	DRILLED SHAFT
	DIMENSIONS	5122110		Size	Ű D	<u>``</u> @	24" DIA. (LF)
	96" X 48"	Type B <sub>FL</sub> or C <sub>FL</sub>	32				•
	192'' X 96''	Type B <sub>FL</sub> or C <sub>FL</sub>	128	W8×18	16	17	12

▲ See Note 6 Below

DEPARTMENTAL	MATERIAL SPEC	CIFICATIONS
PLYWOOD SIGN BLANKS		DMS-7100
ALUMINUM SIGN BLANKS		DMS-7110
SIGN FACE MATERIALS		DMS-8300

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

repeated halfway through the project. The Give Us a Brake (CW21-1T) may be

plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be

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

Texas Department of	of Tra	nsp	ortation	Op L S	Traffic perations Division tandard	
WOR "GIVE US SI WZ	WORK ZONE "GIVE US A BRAKE" SIGNS WZ(BRK)-13					
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8-96 3-03	HOU		MONTGOME	ERY	139	
116						



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LEGEND					
	Type 3 Barricade		Channelizing Devices		
_p	Heavy Work Vehicle	K	Truck Mounted Attenuator (TMA)		
Ē	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)		
-	Sign	$\Diamond$	Traffic Flow		
$\Diamond$	Flag	٩	Flagger		

Posted Speed	Formula	Minimum Desirable Taper Lengths * *		Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	
30	2	150'	165'	180'	30'	60'	120'	90'
35	$L \cdot \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'
40	80	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55	ws	550'	605 <sup>.</sup>	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	4 10'
70		700	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

\* Conventional Roads Only

**\* \*** Toper 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		
	1	1				

### 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 elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- 3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
- 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 wider work spaces. 6. See TCP(5-1)for shoulder work on divided highways, expressways and
- freeways. 7. 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	nt of Transp	ortation	Traffic Operations Division Standard
CW20-1D 48" X 48"	TRAFFIC ( CONVEN SHOU	CONTRO TIONAL LDER	OL PL. ROAD WORK	AN )
See notes 1& /)	FILE: tcp1-1-18.dgn	dn: TXDOT	CK: TXDOT DW:	TXDOT CK: TXDOT
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	LEGEN	٧D	
<u>~~~~</u>	Type 3 Barricade		Channelizing Devices
₿	Heavy Work Vehicle	X	Truck Mounted Attenuator (TMA)
Ē	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
4	Sign	$\langle$	Traffic Flow
$\Diamond$	Flag	٩	Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths * *		Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space	
×		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"8"
30	2	150'	165'	180'	30'	60'	120'	90'
35	$L = \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'
40	00	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55	1 <b>.</b> ws	550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	4 10'
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		
	1	1				

### 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 elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- 3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
- 4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
- 5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000
- feet in urban areas and every 1/4 to 1/2 mile in rural areas. 6. 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.
- 7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
- 8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

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LEGEND								
<u>e</u>	Type 3 Barricade		Channelizing Devices					
□¤	Heavy Work Vehicle	K	Truck Mounted Attenuator (TMA)					
Ē	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)					
•	Sign	$\langle$	Traffic Flow					
$\bigtriangleup$	Flag	۵	Flagger					

Posted Speed	Formula	Minimum Desirable Taper Lengths * *		Suggested Spacing Channelia Devia	Maximum of ting ces	Minimum Sign Spacing	Suggested Longitudinal Buffer Space	
x		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"
30	2	150'	165'	180'	30'	60'	120'	90'
35	$L = \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'
40	60	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55	I .ws	550'	605'	660'	55'	110'	500'	295'
60	L - W 3	600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	4 10'
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		
	1	1				

### 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 elsewhere in the plans,
- or for routine maintenance work, when approved by the Engineer. 3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
- 4. 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 wider work spaces.

### TCP (1-4a)

6. If this TCP is used for a left lane closure , CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

### TCP (1-4b)

7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department	of Tran	nsportation	Traffic Operations Division Standard
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		AL RUA	02
			03
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FILE: tcp1-4-18.dgn © TxDOT December 1985 2-94 4-98	<b>1-4</b> ) DN: TXDOT CONT SE 912 3	AL RUA )-18 [[ CK: TXD0T OW: ECT JOB 37 232	TXDOT CK: TXDOT HIGHWAY CS
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LEGEND								
	Type 3 Barricade		Channelizing Devices					
□‡	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)					
Ð	Trailer Mounted Flashing Arrow Board	<b>M</b>	Portable Changeable Message Sign (PCMS)					
<b>_</b>	Sign	$\Diamond$	Traffic Flow					
$\bigtriangleup$	Flag	ЦO	Flagger					

Posted Speed	Formula	D Tap	Minimum esirable er Lengt x x	hs	Suggested Spacing Channeli Devi	Maximum g of zing ces	Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space
×		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"8"
30	2	150'	165'	180'	30'	60'	120'	90'
35	$L = \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'
40	00	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55	lws	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					
		1							

### 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 elsewhere in the plans, or for routine maintenance work, when approved by the Engineer. 3. Channelizing devices used to close lanes may be supplemented
- with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
- 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 in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

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	LANE (	LANE CLOSURES FOR								
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LEGEND									
<u>~~~~</u>	Type 3 Barricade		Channelizing Devices						
	Heavy Work Vehicle	K	Truck Mounted Attenuator (TMA)						
Ð	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)						
•	Sign	2	Traffic Flow						
$\langle \rangle$	Flag	Ŀ	Flagger						

Posted Speed	Formula	D Tap	Minimum esirable er Lengt * *	hs	Suggested Spacing Channelia Devic	Maximum j of ting ces	Minimum Sign Spacing "Y"	Suggested Longitudinal Buffer Space		
×		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"		
30	2	150'	165'	180'	30'	60'	120'	90'		
35	$L = \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'		
40	60	265'	295'	320'	40'	80'	240'	155'		
45		450'	495'	540'	45'	90'	320'	195'		
50		500'	550'	600'	50'	100'	400'	240'		
55	I = WS	550'	605'	660'	55'	110'	500'	295'		
60	L - W 3	600'	660'	720'	60'	120'	600'	350'		
65		650'	715'	780'	65'	130'	700'	4 10'		
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					
	1	1	1	<b>~</b>					

### 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
- Stockpilled interfact and best of a provided and the provided way.
   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 used anytime it can be positioned and the provided and the 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.





be positioned at end of traffic queue. . The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained. Conflicting pavement marking shall be removed for long term projects. . 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. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space. CP (2-3a) 9. Conflicting pavement markings shall be removed for long-term projects.

LEGEND									
<u>e 7 7 7 7</u>	Type 3 Barricade		Channelizing Devices						
₿	Heavy Work Vehicle	K	Truck Mounted Attenuator (TMA)						
	Trailer Mounted Flashing Arrow Board	••••	Raised Pavement Markers Ty II-AA						
4	Sign	$\langle$	Traffic Flow						
$\langle \rangle$	Flag	۵	Flagger						

Posted Speed	Formula	D Tap	Minimum esirable er Lengt x x	hs	Suggested Spacing Channeli Devi	Maximum g of zing ces	Minimum Sign Spacing "Y"	Suggested Longitudinal Buffer Space	
×		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"	
30	2	150'	165'	180'	30'	60'	120'	90'	
35	$L = \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'	
40	60	265'	295'	320'	40'	80'	240'	155'	
45		450'	495'	540'	45'	90'	320'	195'	
50		500'	550'	600'	50'	100'	400'	240'	
55	ws	550'	605'	660'	55'	110'	500'	295'	
60		600'	660'	720'	60'	120'	600'	350'	
65		650'	715'	780'	65'	130'	700'	4 10'	
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						
				TCP(2-3b)ONLY						
			1	1						

### 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 elsewhere in the plans,

or for routine maintenance work, when approved by the Engineer.

When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.

Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should

For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department		Traffic Operations Division Standard							
TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS									
FILE: tcp(2-3)-18.dgn	dn: TXD	от	CK: TXDOT	DW:	TXDOT	CK: TXDOT			
© TxDOT December 1985	CONT	SECT	JOB		н	GHWAY			
REVISIONS 8-95 3-03	912	37	232			CS			
1-97 2-12	DIST		COUNTY			SHEET NO.			
4-98 2-18	HÔU		MONTGON	IER	Y	145			
163									



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						LEC	GEN	٩D						
			Ту	pe 3 E	Barricac	le				Channel	izing Device	es		
		臣	Не	eavy Work Vehicle				K		Truck M Attenua	lounted tor (TMA)			
	I	Ð	Tr Flo	railer Mounted lashing Arrow Board				€		Portabl Messag	le Changeable ge Sign (PCMS)			
		ŀ	Siq	gn				$\langle h \rangle$		Traffic	Flow			
	<	$\langle \rangle$	Fle	og				٩C	)	Flagger	lagger			
Poste Spee	ed d	Formul	0	D Tap	Minimum esirable er Lengt ж ж	hs	Sug C	gested Spacing hanneliz Devia	sted Maximum acing of nnelizing Devices		Minimum Sign Sugge Spacing Longitud uvu Buffer S		ed al ace	
x				10' Offset	11' Offset	12' Offset	C Te	)n a oper	Т	On a angent	Distance "B"			
30	-		_2	150'	165'	180'		30'		60'	120'	90'		
35	ò	$L = \frac{W}{60}$	<u>s</u>	205'	225'	245'		35'		70'	160'	120'		
40	-	00	'	265'	295'	320'		40'		80'	240'	155'		
45	ī			450'	495'	540'		45'		90'	320'	195'		
50				500'	550'	600'		50'		100'	400'	240	_	
55	5   • ws		5	550'	605'	660'		55'		110'	500'	295'		
60				600'	660'	720'		60'		120'	600'	350'		
65	-	650' 715' 780' 65'		65'		130'	700'	4 10'						
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					
		1	1						

### 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 elsewhere in the plans,

or for routine maintenance work, when approved by the Engineer

3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.

For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.

. 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.

Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

### CP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

### CP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department	of Tra	nsp	ortation	Op L S	Traffic perations Division tandard	
TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS						
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©TxDOT December 1985	CONT	SECT	JOB		HIGHWAY	
REVISIONS	912	37	232		CS	
1-97 2-12	DIST	IST COUNTY S			SHEET NO.	
4-98 2-18	HOU MONTGOMERY 146				146	
164						





LEGEND							
<u>e</u>	Type 3 Barricade		Channelizing Devices				
	Heavy Work Vehicle	K	Truck Mounted Attenuator (TMA)				
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)				
4	Sign	2	Traffic Flow				
$\langle \rangle$	Flag	Ŀ	Flagger				

Posted Speed	Formula	D Тар	Minimum esirable er Lengt x x	imum Suggested Maximum rable Spacing of Lengths Channelizing * Devices		Minimum Sign Spacing "Y"	Suggested Longitudinal Buffer Space	
×		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"8"
30	2	150'	165'	180'	30'	60'	120'	90'
35	$L = \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'
40	80	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55	I ∎WS	550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	4 10'
70		700'	770'	840'	70'	140	800'	475'
75		750'	825	900'	75'	150'	900'	540'

\* Conventional Roads Only

**\* \*** Toper 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		
			1	1		

### 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 elsewhere in the plans, or for routine maintenance work, when approved by the Engineer. 3. 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 eposure 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 substitutued for the Shadow Vehicle and TMA. 4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
- 5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

### TCP (2-5a)

6. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging toper.

### TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation						Traffic erations Division tandard
TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.						
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© TxDOT December 1985	CONT	SECT	JOB			HIGHWAY
8-95 2-12	912	37	232			CS
1-97 3-03	DIST		COUNTY			SHEET NO.
4-98 2-18	HOU		MONTGON	<b>IE</b> R	Y	147
165						



	LEGEND						
<u>e                                    </u>	Type 3 Barricade		Channelizing Devices				
	Heavy Work Vehicle	K	Truck Mounted Attenuator (TMA)				
Ð	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)				
-	Sign	2	Traffic Flow				
$\langle \rangle$	Flag	Ŀ	Flagger				

Posted Speed	Formula	Minimum Suggested Maximum Desirable Spacing of Taper Lengths Channelizing <b>x x</b> Devices		Minimum Suggested Maximum Minimu Desirable Spacing of Sign Taper Lengths Chonnelizing Spacin * * Devices Spacin		Minimum Sign Spacing	Suggested Longitudinal Buffer Space	
×		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"8"
30	2	150'	165'	180'	30'	60'	120'	90'
35	$L = \frac{WS}{60}$	205'	225'	245'	35'	70'	160'	120'
40	80	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55	l . ws	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		
				1		

### GENERAL NOTES

Flags attached to signs where shown, are REQUIRED.

. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device. The placement of pavement markings may be omitted on Intermediate-ter stationary work zones with the approval of the Engineer. Shadow Vehicle with TMA and high intensity rotating, flashing,oscillating or strobe lights. 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. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space. Traffic Operations Division Standard \* Texas Department of Transportation TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS TCP(2-6)-18

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© TxDOT December 1985	CONT	SECT	JOB		HIGHWAY
REVISIONS	912	37	232		CS
8-95 2-12	DIST		COUNTY		SHEET NO.
1-97 2-18	HOU		MONTGON	<b>IERY</b>	148
166					



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LEGEND					
Trail Vehicle					
Shadow Vehicle	ARROW BOARD DISPLAY				
Work Vehicle	<b>P</b>	RIGHT Directional			
Heavy Work Vehicle	<b>-</b>	LEFT Directional			
Truck Mounted Attenuator (TMA)	Double Arrow				
Traffic Flow	0	CAUTION (Alternating Diamond or 4 Corner Flash)			
TYPICAL USAGE					

LE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY				
,								

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions,

2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.

3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE

4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.

5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.

6. Each vehicle shall have two-way radio communication capability.

7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to

8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.

9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE

10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the

Red Reflective White Reflective	Texas Department	of Transp	ortation	Traffic Operations Division Standard			
TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS							
	TC	P(3-	1) - 13				
A) 7	FILE: tcp3-1.dgn	DN: TXDOT	CK: TXDOT DW:	TXDOT CK: TXDOT			
	© TxDOT December 1985	CONT SECT	JOB	HIGHWAY			
R TMA	REVISIONS	912 37	232	CS			
	8-95 7-13	DIST	COUNTY	SHEET NO.			
	1-97	HOU	MONTGOMER	Y 149			
	175						



the "Texas Engineering Practice soever. TxDOT assumes no respo rect results or damages resulting hđt: s governed purpose w DISCLAMER: The use of this standard is kind is made by TxDOT for any of this standard to other format

DATE:

			LE	GEND								
ŧ	Troil Vehicle											
ŧ	Shadow	ARROW BOARD DISPLAY										
ŧ	Work Ve	ehicle		→	RIGHT Directional							
כ	Heavy W	Vork Vehic	le	E	LEFT Directional							
	Truck Mounted			€	Double Arrow							
	Attenuator (TMA)				CAUTION (Alternating							
				╵∎╵	Diamond or 4 Corner Flash)							
_		CUODT	TY	PICAL US								
м	OBILE	DURATION	N STA	TIONARY	TERM STATIONARY STATIONARY							
	4											
S O	nd SHADO boards on WORK rmed. The	W vehicle as per the vehicles arrow bo	s shallt Barric willbe bards s	be equipp ade and optional b hall be op	bed with Type B Construction (BC) ased on the berated from							
er it	will deter ions, traff both TCP	mine if the ic volume, (3-2a) and	e TRAIL and sid d TCP(3	VEHICLE ght distar 5-2b) are	E is required based on nce restrictions. All required.							
ie J. ht	nsity roto Blue high ed on the mber bead	ating, flashi 1 intensity 2 driver's 2 ons or st	ing, osc rotatin side of robe lic	illating, or g, flashing the vehi ghts.	r strobe lights g, oscillating or cle may be operated							
J ic	attenuata les are re	ors (TMA) ( equired.	on the	ADVANCE	WARNING,							
M	rear of th S 8300, T	ne TMA sh Type A.	all meet	or exce	ed the reflectivity and							
0	-way radi	o commun	ication	capability	/.							
, ,	hange lan vehicles.	ies, the TF	RAIL VE	HICLE sh	ould change lanes first to							
;h n L m	e TRAIL \ ce restric e TRAIL \ VEHICLE. ay vary c	/EHICLE ar tions. Mot /EHICLE in Vehicle s occording	nd the orists of time t pacing to terro	SHADOW approachi o slow d between ain, work	VEHICLE will vary ing the work convoy Jown and/or change lanes as the WORK VEHICLE activity and other factors.							
	nd shaped Juate mou	d warning Inting spac	signs w e exist	ith the s s.	ame message as those shown							
einri ei	used on (PCMS) a ght of 12" ate direct rrow boa When this	the Advar or a truck t, and disp tional arrow rd, must b is done, t	nce War mounte laying t v displa e used he arro	ning Veh ed change he same y, simulat in the se w board	icle. As an option, a portable eable message sign (TMCMS) with legend may be substituted for ting the size and econd phase of the will not be required on the							
e s	rsions of hown are	the CW20 not availa	)-5 seri ble.	ies signs	may be used as an option							
e	t may be number o	used to o f lanes, sh	close la oulder v	nes fro <del>n</del> vidth, sigt	n the left side of the nt distance,and ramp							
b er	oard mod ior closur	es shall be es which a	approj close tr	priately c ne left la	oltered when implementing nes.							
ic	le may s	traddle th	e edgel	ine when	shoulder width makes it							
/	-Red Refle -White Re	ective flective		Те	* exas Department of Transportation	Traffi Operati Divisio Standa						
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# MOBILE OPERATIONS DIVIDED HIGHWAYS

IGHT OF

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± 6'

TCP(3-2)-13													
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2-04 4-0	REVISIONS		912         37         232           DIST         COUNTY		232				:s				
8-95 7-1	3						SHEET NO.						
1-97	1		HOU	MONTGOMERY			Y	150					


LEGEND						
*	Trail Vehicle		ARROW BOARD DISPLAY			
* *	Shadow Vehicle					
* * *	Work Vehicle	₽	RIGHT Directional			
<u>∎</u> p	Heavy Work Vehicle	E C	LEFT Directional			
	Truck Mounted Attenuator (TMA)	<b>₽</b>	Double Arrow			
$\Diamond$	Traffic Flow	0	CAUTION (Alternating Diamond or 4 Corner Flash)			

TYPICAL USAGE								
MOBILE	SHORT DURATION	SHORT TERM	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY				
4								

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. 2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights. 3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION 5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the Cech vehicle shall have two-way radio communication capability.
When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used. 10.For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle. 11.A double arrow shall not be displayed on the arrow board on the Advance Warning 12.For divided highways with three or four lanes in each direction, use TCP(3-2). 13.Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available 14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes 15.On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

	Texas Department TRAFFIC MOBILE RAISED MARKER II RI TCP(	of Tra CON OPE PA NST EMO 3-3	IR TR TR VE AL VA	OL PI ATIONS MENT LATION	LAN S	iraffic erations ivision andard
FILE:	tcp3-3.dgn	DN: TXD	OT	CK: TXDOT C	w:TXDOT	CK: TXDOT
(C) T x D(	OT September 1987	CONT	SECT	JOB	1	HIGHWAY
2.04	REVISIONS	912	37	232		CS
8-95	4-90 7-13	DIST		COUNTY		SHEET NO.
1-97	7-14	HOU		MONTGOME	ERY	151
177						



LE	GEND	
/ehicle		
ow Vehicle		ARROW BOARD DISPLAT
Vehicle	<b>•</b>	RIGHT Directional
y Work Vehicle	<b>-</b>	LEFT Directional
: Mounted uator (TMA)	₽	Double Arrow
ic Flow		Channelizing Devices

Minimum Desirable Taper Lengths * *		Suggested Spacing Channeliz Devic	Maximum y of zing ces	Minimum Sign Spacing	Suggested Longitudinal Buffer Space		
10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"	
150'	165'	180'	30'	60'	120'	90'	
205'	225'	245'	35'	70'	160'	120'	
265'	295'	320'	40'	80'	240'	155'	
450'	495'	540'	45'	90'	320'	195'	
500'	550'	600'	50'	100'	400'	240'	
550'	605'	660'	55'	110'	500'	295'	
600'	660'	720'	60'	120'	600'	350'	
650'	715'	780'	65'	130'	700'	4 10'	
700'	770'	840'	70'	140'	800'	475'	
750'	825'	900'	75'	150'	900'	540'	

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

TYPICAL USAGE							
E	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY			

 This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic controlplan should be used.

2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping shall be 8" red on the back panel of all truck mounted attenuators and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.

3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.

4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating,flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.

5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.

Reflective e Reflective	Texas Department o	of Tran	sportation	Op L	Traffic erations Division tandard
+ 6" (HEIGHT OF TMA)	TRAFFIC CO MOBILE OPE ISOLATED UNDIVIDED	ONT RA1 WOI HI(	ROL P IONS RK AR GHWAY	FOR EAS	anuaru
	TCF	<b>&gt;(</b> 3	-4)-1	3	
<b></b> +	FILE: tcp3-4.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
	CTxDOT July, 2013	CONT SE	ECT JOB		HIGHWAY
'MA	REVISIONS	912 3	37 232		CS
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on-line manuals.

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MONTGOMERY

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## TYPICAL ADVANCE SIGNING TO REMAIN PLACE DURING ALL PHASES OR AS DIRECTED BY ENGINEER



## CONSTRUCTION WARNING SIGN SPACING

POSTED SPEED (MPH)	"X" SIGN SPACINGS (FEET)
30 OR LESS	120
35	160
40	240
45	320
50	400
55	500
60	600
65	700
70	800

TYPICAL TRANSITION LENGTHS AND

SUGGESTED MAXIMUM SPACING OF DEVICES

		MINIMUM DESIRABLE			SUGGE	STED MAX.	MINIMUM SIGN SPACING
POSTED SPEED	FORMULA	10' OFFSET	11' OFFSET	12' OFFSET	ON A TAPER	ON A TANGENT	DISTANCE
30		150'	165 <sup>.</sup>	180 <sup>.</sup>	30 <sup>.</sup>	60'-75'	120'
35	L• <u>WS</u> ²	205'	225 <sup>.</sup>	245'	35'	70'-90'	160'
40		265'	295 <sup>.</sup>	320'	40'	80'-100'	240'
45		450'	495'	540'	45'	90'-110'	320'
50		500 <sup>.</sup>	550 <sup>.</sup>	600 <sup>.</sup>	50'	100'-125'	400'
55	L-WS	550'	605'	660 <sup>.</sup>	55'	110'-140'	500'
60		600 <sup>.</sup>	660 <sup>.</sup>	720'	60'	120'-150'	€600'
65		650'	715'	780'	65'	130'-165'	⊙700 <sup>.</sup>
70		700'	770'	840'	70'	140'-175'	€800 <sup>.</sup>

CONVENTIONAL ROADS ONLY

€ € TAPER LENGTHS HAVE BEEN ROUNDED OFF.

# LEGEND

- CONSTRUCTION AREA
- TEMPORARY PAVEMENT
- OPEN TO TRAFFIC

SHEET 1 OF 2

Texas Department of Transportation Houston District

TWO WAY ROADWAY INTERSECTION PHASING

# TWRIP(1) TC2010-09

FILE:	DN:TXD	OT	CK: TXDOT	DW:	TXDOT	CK: TXDOT
© T×DOT OCT 2009	CONT	SECT	JOB		HIGHWAY	
REVISIONS	912	37	232		CS	
	DIST	COUNTY			5	SHEET NO.
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### TYPICAL ADVANCE SIGNING TO REMAIN PLACE DURING ALL PHASES OR AS DIRECTED BY ENGINEER



ROAD WORK AHEAD CW20-1D

### CONSTRUCTION WARNING SIGN SPACING

POSTED SPEED (MPH)	"X" SIGN SPACINGS (FEET)
30 OR LESS	120
35	160
40	240
45	320
50	400
55	500
60	600
65	700
70	800

### TYPICAL TRANSITION LENGTHS AND SUGGESTED MAXIMUM SPACING OF DEVICES

		MINIMUM DESIRABLE			SUGGE	STED MAX.	MINIMUM SIGN SPACING
POSTED SPEED	FORMULA	10' OFFSET	11' OFFSET	12' OFFSET	ON A TAPER	ON A TANGENT	X DISTANCE
30		150'	165'	180'	30'	60'-75'	120'
35	L- <u>WS</u> <sup>2</sup>	205 <sup>.</sup>	225'	245'	35 <sup>.</sup>	70'-90'	160'
40		265'	295 <sup>.</sup>	320'	40'	80'-100'	240'
45		450'	495 <sup>.</sup>	540'	45'	90'-110'	320'
50		500'	550 <sup>.</sup>	600'	50'	100'-125'	400'
55	L•WS	550'	605'	660'	55'	110'-140'	500'
60		600 <sup>.</sup>	660 <sup>.</sup>	720'	60 <sup>.</sup>	120'-150'	€ <b>600</b> '
65		650'	715'	780'	65'	130'-165'	⊙700 <sup>.</sup>
70		700 <sup>.</sup>	770'	840'	70'	140'-175'	<b>⊙800</b> '

CONVENTIONAL ROADS ONLY

€ € TAPER LENGTHS HAVE BEEN ROUNDED OFF.

## LEGEND

<b>[</b> ]]]]	CONSTRUCTION AREA
	TEMPORARY PAVEMENT
	OPEN TO TRAFFIC

SHEET 2 OF 2

Texas Department of Transportation Houston District

TWO WAY ROADWAY INTERSECTION PHASING

# TWRIP(2) TC2010-09

FILE:	DN: TXC	от	CK: TXDOT	DW:	TXDOT	CK: TXDOT	
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	DIST		COUNT	Y		SHEET NO.	Т
	HOU		MONTGOM	<b>I</b> ER	Y	157	10



## TYPICAL TRANSITION LENGTHS AND

# SUGGESTED MAXIMUM SPACING OF DEVICES

		TAPER	AI DESIR ≀LENGT	ABLE 'HS⊛⊛	SUGGE	STED MAX.	MINIMUM SIGN SPACING
POSTED SPEED	FORMULA	10' OFFSET	11' OFFSET	12' OFFSET	ON A TAPER	ON A TANGENT	DISTANCE
30		150'	165'	180'	30'	60'-75'	120'
35	L• <u>WS</u> ²	205'	225 <sup>.</sup>	245'	35'	70'-90'	160'
40		265 <sup>.</sup>	295 <sup>.</sup>	320 <sup>.</sup>	40'	80'-100'	240'
45		450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600 <sup>.</sup>	50'	100'-125'	400'
55	L•WS	550 <sup>.</sup>	605 <sup>.</sup>	660 <sup>.</sup>	55 <sup>.</sup>	110'-140'	500'
60		600 <sup>.</sup>	660 <sup>.</sup>	720 <sup>.</sup>	60'	120' - 150'	€600 <sup>,</sup>
65		650 <sup>.</sup>	715 <sup>.</sup>	780 <sup>.</sup>	65 <sup>.</sup>	130'-165'	⊙700 <sup>.</sup>
70		700	770	840'	70'	140'-175'	€800'

CONVENTIONAL ROADS ONLY

• TAPER LENGTHS HAVE BEEN ROUNDED OFF

## CONSTRUCTION WARNING

SIGN SP	ACING
POSTED SPEED (MPH)	"X" SIGN SPACINGS (FEET)
30 OR LESS	120
35	120
40	240
45	320
50	400
55	500
60	600
65	700
70	800

## LEGEND

CONSTRUCTION AREA

OPEN TO TRAFFIC

Texas Department of Transportation Houston District BOULEVARD CLOSURES TCPTC 3050-96 DNIXDOT CK: TXDOT DW: TXDOT CK: TXDO REVISIONS REV. 5/2006 CONT SECT JOB HIGHWAY 912 37 232 CS DIST COUNTY SHEET NO HOU MONTGOMERY 158







- DRUMS (TYP.)

2) BUILD OTHER HALF OF DRIVE



SINGLE ACCESS DRIVES











TYPICAL LOCATION OF DRIVEWAY SIGN

NOTE: ON 2-WAY ROADWAYS, TWO



## TYPE III PVC BARRICADES TYPICAL DESIGN DETAILS

MAY BE USED AT THE OPTION OF THE CONTRACTOR.

NOTES:

- 1. ALL PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PRESSURE RATED PIPE SDR 21 OR SDR 26 ASTM D2241.
- 2. JOINT FITTINGS MAY BE PVC-ASTM D2665 OR ACRYLONITRILE BUTADIENE STYRENE (ABS) ASTM D2661 (DRAINAGE WASTE AND VENT).
- 3. ALL PIPE AND FITTINGS SHALL BE WHITE.
- 4. ALL JOINTS SHALL BE FREE TO SEPARATE UPON VEHICLE IMPACT.
- CROSS HATCHED CONDUIT TO BE TIED TOGETHER WITH ROPE THREADED INTO PIPE INTERIOR. USE <sup>3</sup>/<sub>6</sub>" NO. 6 SOLID BRAIDED NYLON OR EQUIVALENT.
- 6. A FIXED FRANGIBLE PAVEMENT CONNECTION IS PREFERRED. SAND BAGS MAY BE SUBSTITUTED.

# CONSTRUCTION SIGN NOTES

MATERIALS

CONSTRUCTION SIGNS SHALL BE MADE FROM APPROVED FIBERGLASS OR HIGH IMPACT PLASTIC AS PRIMARY MATERIALS. SIGN SHEETING

REFLECTORIZED SIGN SHALL BE CONSTRUCTED OF RETRO REFLECTIVE SHEETING MEETING THE COLOR AND REFLECTIVITY REQUIREMENTS OF MATERIAL SPECIFICATIONS, DMS-8300.

TYPE C SHEETING SHALL BE USED FOR THIS APPLICATION.

SIGN LETTERS

ALL SIGNS LETTERING SHALL BE CLEAR, OPEN ROUNDED TYPE CAPITAL LETTERS AS APPROVED BY AND AS PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION. SIGNS AND LETTERING SHALL BE OF FIRST CLASS WORKMANSHIP EQUIVALENT TO THAT OF THE DEPARTMENT'S STANDARD SIGNS.

Texas Depa Hous	Texas Department of Transportation Houston District												
DRIVEWA	Υ	SI	GNING										
DS T	C8	02	0-04										
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© TxDOT 2004	CONT	SECT	JOB	I	HIGHWAY								
REVISIONS	912	37	232		CS								
	DIST		COUNTY		SHEET NO.								
	HOU		MONTGOMER	Y	160								







Inlets Shall Be Built To Stage I And Finished After All Grading Operations Are Substantially

FILE: STDD4.DCN DN: TXD0T CK: TXD0T DW: TXD0T © TXD0T 2014 DIST FED REG PH REVISIONS HOUS 6 X/30/2016:Removed Manhole Steps	DT CK:TXDOT S ROJECT NO.	std: 	еет 3 <b>3</b> іway
HIL-A   FILE: STDD4.DCN   DN: TxD0T   C TxD0T   2014 DIST   REVISIONS HOUS   6	DT CK:TxDOT S	STD: SHEE 163	EET 33
FILE: STDD4.DCN DN: TXDOT CK: TXDOT OW: TXDOT © TXDOT 2014 DIST FED REG PH	)T CK:TxDOT S	STD: SHEE	EET
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INLET TYPE 4	À		
Houston District		0	



















4/6/2021

												TEN	PORARY SI	GNAL	AERIAL	SP	AN. CON	DUIT.	CABLE SC	HEDU	JLE									
					CONDL	IT	(618)							PO	WER		···· <b>,</b> ···	ILLU	JMINATION	IN	DICATIONS		SPAN	WIF	RE		۷I	VDS		
						PVC							POWER		GRC	DUND		LI	IGHTING		SIGNAL		WIRE	STRA	AND		۷I	VDS		ССТ
	HIGH VOLT LOW VOLT	2"	(SCHD 80)		3" (S	CHD	80)		4" (S	CHD	80)	2 (Te	2-#6 AWG XHHW EMP POWER)	BAR #8	E BOND SOLID (BB)	BA #8	RE GRND 3 SOLID (BB)	#12	/4C Tray Cable		#14/7C	1/ MSG	4" GUY R CABLE	MSC	3∕8" GR CABLE	#	16/3C	R-	59 COAX	USE E DAT TO MA
		NO.	TRENCH	I NO.	TRENCH	NO.	BORE	NO.	TRENCH	I NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.
N. 1 v	111/	EA 1		EA	LF	EA		EA	LF	EA	LF	EA	LF	EA	LF	EA		EA		EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	
	HV		IN N	+		-				+		-	25	+		1	25		25	+				-				+		+
N-2*	HV	+	IN	+		-	-	+	1.0	+		4	20	+			25	2	25	10	10	+					10		1.0	+
) N_25 x	HV	$\left  \right $		+			-			+		2	10	$\vdash$					45	10	10			-	-	4	10	4	10	+
N-25*	HV			-		-			IN	1	NI							2	45	10	45					4	45	4	45	+
N-26*	HV			_						1	IN N							2	55	10	55					4	55	4	20	+
N-28*	HV				NI	+					IN	-						2	40	10	40					4	40	4	40	+
N-29*	HV				N	-				-		_						2	15	10	15		105	1	1.0.5	4	15	4	15	+
48	HV			-		-				-								- 1	165	4	165		100	1	165	2	105	2	100	+
A9	HV			-		-				-								1	1.05		100		100		100		100	-	100	-
A10	HV			_		-												1	105	6	105		105		105	2	105	2	105	
A11	HV			-		+				-		-						1	65	5	85		85		85	2	65	2	80	+
A12	HV			_		-				-		_									22		175		25					
A13	HV			-		-				-										7	135		135	1	135					-
	HV			1	NI	-														5	170		170	<u> </u>	170					-
N-10*	HV				N	-				1	NI	-																		
N-12*	HV			-		+	-				IN N	-																		+
N 16 x	HV			1	NI	-				- '	IN									-										-
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SCHEDULE LEGEND: N - PERMANENT SIGNAL CONDUIT∕POLE. A - AERIAL RUN ★ - SEE PERMANENT SIGNAL PLAN FOR DETAILS. RUN ID MAY NOT BE THE SAME BETWEEN TEMP SIGNAL AND PERMANENT PLAN.

		RAILROAD PREEMPT
RUN NO.		RR RELAY TRAF SIG
		14C/#14
	NO.	LENGTH
	F A	L E I F
N-1 *		
N-2*		
3	1	10
N-25*	1	45
N-26*	1	55
N-28*	1	40
N-29*	1	15
A8		
Α9		
A10	1	105
A11	1	85
A12	1	55
A13	1	135
A14		
N-10*	1	10
N-12*	1	55
N-14*	1	85
N-16*	1	15
N-17*		50
N-POLE C*	1	35
N-POLE F*	1	35
TI-LUM ARM		
I J-LUM ARM		
	+	
	+	10
	+	840
		925
L EST. IVIAL		920

ITEM	DESCRIPTION	UNIT	QTY
620 6007	ELEC CONDR (NO.8) BARE	LF	235
620 6010	ELEC CONDR (NO.6) INSULATED	LF	160
621 6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	955
625 6001	ZINC-COAT STL WIRE STRAND (1/4")	LF	900
625 6003	ZINC-COAT STL WIRE STRAND (3/8")	LF	900
627 6002	TIMBER POLE (CL 2) 40 FT	EA	5
680 6004	REMOVING TRAFFIC SIGNALS	EA	1
681 6001	TEMP TRAF SIGNALS	EA	1
681 SUB10	DETECTOR UNIT (DUAL CHANNEL)	EA	12
681 SUB11	SIGN D3-1G - "Northpark Dr" (90"X18")	EA	2
681 SUB13	SIGN D3-1G - "Loop 494 (66"X18")	EA	2
681 SUB14	SIGN R10-21 (30"X36")	EA	2
681 SUB15	CCTV CABLE	EA	415
681 SUB16	BROADBAND RADIO CABLE	EA	415
681 SUB6	CONTROLLER FULL-ACTUATED W/CABINET	EA	1
681 SUB7	TRAFFIC SIGNAL CONTROLLER FOUNDATION	EA	1
681 SUB8	GROUND ROD, 5/8" X 10' COPPER	EA	6
681 SUB9	DETECTOR CARD RACK (8 SLOT & 4 SLOT)	EA	1
682 6001	VEH SIG SEC (12")LED(GRN)	EA	17
682 6002	VEH SIG SEC (12")LED(GRN ARW)	EA	8
682 6003	VEH SIG SEC (12")LED(YEL)	EA	17
682 6004	VEH SIG SEC (12")LED(YEL ARW)	EA	8
682 6005	VEH SIG SEC (12")LED(RED)	EA	17
682 6006	VEH SIG SEC (12")LED(RED ARW)	EA	8
684 6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	5255
684 6040	TRF SIG CBL (TY A) (14 AWG) (14 CONDR)	EA	925
690 6021	REMOVAL OF TIMBER POLES	EA	5
690 6069	INSTALL OF LUMINAIRE MAST ARMS	EA	4
690 6081	INSTL DOWN GUY AND ANCHOR W/GUARD	EA	5
690 6083	REMOVE DOWN GUY AND ANCHOR W/GUARD	EA	5
6000 6130	INSTALL LUMINAIRE 250 W EQ (LED)	EA	2
6010 6012	RELOCATE CCTV FIELD EQUIPMENT	EA	1
6062 6042	RELOCATE ITS RADIO	EA	1
6094 6019	VIVDS MULTI CON COM CAX CBL(3COND16AWG)	LF	1815
6306 6006	VIVDS TEMPORARY	EA	4
6306 6019	VIVDS TEMPORARY (REMOVE)	EA	4

SEE PERMANENT TRAFFIC SIGNAL PLANS FOR ADDITIONAL DETAILS FOR USE WITH TEMPORARY TRAFFIC SIGNAL OPERATION. SUBSIDIARY TO ITEM 681

















					TEMP	ORA	RY SIGNA	L C	ABLE SCH	EDUL	.E					
			CONE	DUIT					V	IVDS	5		ССТV	COMM CABLE		
			P١	/C					TEMP C	DETE	CTION	ССТ	V CAMERA			
RUN NO.	LOW VOLT	3"	(SCHD 80)		4" (SC	CHD (	) 80) # 16/3C R-59 COAX		-59 COAX	USE E DAT TO MA	XIST TYPE A/POWER ATCH EQUIP	USE EXIST TYPE COMM/POWER TO MATCH EQUIP				
		NO.	TRENCH	NO.	TRENCH	NO.	BORE	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH	
		ΕA	LF	ΕA	LF	ΕA	LF	ΕA	LF	ΕA	LF	ΕA	LF	EA	LF	
N-3*	LV					2	Ν	3	15	3	15	1	15	1	15	
N-6*	LV	1	N													
N-8*	LV	1	N					1	40	1	40					
N-11*	LV	1	N					1	30	1	30	1	30	1	30	
N-26*	LV			1	N											
N-32*	LV					1	Ν	2	135	2	135					
N-POLE A	LV							1	20	1	20					
N-POLE B	LV							1	20	1	20					
N-POLE C	LV							1	20	1	20	1	20	1	20	
N-MA	LV							1	55	1	55					
N-MB	LV							1	30	1	30					
N-MC	LV							1	55	1	55					
SLACK +	LV							1	10	1	10	1	10	1	10	
TOTAL (LF)									640		640		75		75	
EST. TOTAL									705		705		85		85	

SCHEDULE LEGEND:

N - PERMANENT SIGNAL CONDUIT/POLE/MAST ARM.

\* - SEE PERMANENT SIGNAL PLAN FOR DETAILS.

+ - FOR CONSTRUCTION PHASE ADJUSTMENT

ITEM DESCRIPTION	UNII	QTY
625 6003 ZINC-COAT STL WIRE STRAND (3/8")		
	LF	60
680 6004 REMOVING TRAFFIC SIGNALS	EA	1
681 6001 TEMP TRAF SIGNALS	EA	1
681 SUB1 SIGN R3-5R (30"X36")	EA	1
681 SUB11 SIGN D3-1G - "Northpark Dr" (90"X1	8") EA	1
681 SUB12 SIGN D3-1G - "Russell Palmer Rd" (	120"X18") EA	2
681 SUB15 CCTV CABLE	EA	85
681 SUB16 BROADBAND RADIO CABLE	EA	85
681 SUB2 SIGN R3-3RM (30"X36")	EA	1
681 SUB3 SIGN R10-12 (30"X36")	EA	1
682 6001 VEH SIG SEC (12")LED(GRN)	EA	1
682 6003 VEH SIG SEC (12")LED(YEL)	EA	1
682 6005 VEH SIG SEC (12")LED(RED)	EA	1
6094 6019 VIVDS MULTI CON COM CAX CBL (3COND1	6AWG) LF	705
6010 6012 RELOCATE CCTV FIELD EQUIPMENT	EA	1
6062 6042 RELOCATE ITS RADIO	EA	1
6306 6014 VIVDS CAM ASSY (RELOCATE)	EA	3
6306 6019 VIVDS TEMPORARY (REMOVE)	EA	3

SEE PERMANENT TRAFFIC SIGNAL PLANS FOR ADDITIONAL DETAILS FOR USE WITH TEMPORARY TRAFFIC SIGNAL OPERATION.

• - SUBSIDIARY TO ITEM 681





D3-1G(2) 8in;

1.5" Radius, 0.5" Border, White on, Green; "SL 494", ClearviewHwy-3-W; "494", ClearviewHwy-3-W;



D3-1G(2) 8in; 1.5" Radius, 0.5" Border, White on, Green; "Northpark Dr", ClearviewHwy-3-W;



D3-1G(2) 8in; 1.5" Radius, 0.5" Border, White on, Green; "Russell Palmer Rd", ClearviewHwy-3-W;



4/6/2021

7:51:09 PM





4/6/2021

6:16:04 PM





SIGNAL HEADS DURING THE VARIOUS PHASES OF CONSTRUCTION.

NOTE: BACKPLATES OMITTED FOR CLARITY (IF REQUIRED)

Texas	Б Dep На	Dartı Dustori	ner Dis	n <b>t of</b> strict	Trai	nspo	n'i	tation
SIGNAL CONSTRU TRA	DE CT AFF (WC CI	[ A ] [ ON I C OD D/1	L N F TS,	S/S DET SIGN POLE /WP	TA AI NAL E)	ND. LS .S	A	RDS FOR
FILE:	DN:		ск:		DW:		С	к:
© TxDOT 2008	DIST	FED RE	G	PRO	JECT N	ю.		SHEET
REVISIONS 03-07	HOU	6						183
05-08	С	OUNTY		CONTROL	SECT	JOB		HIGHWAY
8-12	MONT	GOME	ERY	0912	37	232		CS

STD-M10



STD-M11

NOTES FOR VIDEO DETECTION:

- 1. INSTALL VIDEO DETECTION PROCESSOR UNIT INSIDE CONTROLLER CABINET.
- 2. INSTALL VIDEO DETECTION CAMERA & BRACKET AS DETAILED OR AS DIRECTED BY THE VIDEO DETECTION SUPPLIER.
- 3. MOUNT CAMERAS AS FAR OVER THE ROADWAY AS POSSIBLE.
- USE ¾ IN. STAINLESS STEEL BANDING MATERIAL TO INSTALL CAMERA MOUNTS.
- 5. AIM CAMERA SO THAT HORIZON IS NOT VISIBLE IN THE FIELD OF VIEW.
- 6. INSTALL CAMERA ENCLOSURE ASSEMBLY SO THAT IT CAN ROTATE AFTER INSTALLATION TO PROVIDE PROPER ALIGNMENT.
- 7. PROVIDE WATER TIGHT CABLE ENTRY AND EXIT POINTS IN THE MAST ARM AND/OR POLES.
- 8. FOR VIVDS COAX AND POWER CABLES ATTACHED TO LUMINAIRE ARM, PROVIDE A METAL CABLE STRAP (ALUMINUM OR STAINLESS STEEL), 3/4-IN MINIMUM WIDTH AND TWO WRAPS AT 8 IN. MAXIMUM SPACING.

     *     	4 FT. PIPE EXTENSION WHEN MOUNTED ON TRAFFIC SIGNAL MAST ARM.
 	¾IN. (MIN) STAINLESS STEEL BANDING 2 PLACES MIN.
, , , , , ,	ENTRY INTO STEEL POLE OR CONDUIT WEATHERHEAD ON WOOD POLE







## OTHER MATERIALS:

- 3. Nylon insert locknuts shall conform to ASTM A563.

### GENERAL NOTES:

- galvanizing process.



PROJECTION

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.

2, Welded tabs and backplates shall be ASTM A-36 steel or better.

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the

3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts,  $\frac{1}{2}$  in. X  $\frac{1}{2}$  in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.

4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.

5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.

6. Approximately 2 in. diameter hole in upper mast arm clamp.



For 8.9 - 12 inch diameter Signal Poles (Two req'd for each mast arm)

Texas Department of Transportation Traffic Operations Division											
FILLING ASSEMBLY FOR											
LUMINAIRE MAST ARM											
			-01								
				٢F	Δ.	-12					
LOWITHA				CF	Α-	-12					
	DN: KAB		CK: RES	CF	<b>A</b>	- 1 2					
	DN: KAB CONT	SECT	CK: RES	CF	<b>A</b> -	- 12 CK: CAL					
© TxDOT REVISIONS 11-29	DN: KAB CONT 0912	SECT	CK: RES JOB 232	CF	A FDN	- 12 (K: CAL HIGHWAY CS					
© TxDOT REVISIONS 11-99 1-12	DN: KAB CONT 0912 DIST	SECT	CK: RES JOB 232 COUNTY		FDN	- 12 CK: CAL HIGHWAY CS SHEET NO.					
© TxDOT REVISIONS 11-99 1-12	DN: KAB CONT 0912 DIST HOU	SECT	CK: RES JOB 232 COUNTY MONTGON		FDN	- 12 (K: CAL HIGHWAY CS SHEET NO. 185A					

LEGEND					
= FOUND CONTROL MONUMENT					
	SURVEY	CONTROL	INDEX	SHEE	T
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				5.00	0
		MARY OWENS	SURVEY,		SC
		ABSTRAC	T 405	· ////	1" = 200' 1" = 400'
				·///·	
	BEGIN NORTHPARK F	ROJECT BL = 20.50 23	E DATA (C1)	BAS	ELINE CURVE DAT
APPROX. LOCATION CITY LIN	MIT LINE	-37-232	2.97 79		10,025,779.88 3,906,782.20 2,000.00'
CITY OF HOUSTON	N:10,026,203.37 E: 3,905,161.74 LATITUDE:30°04′11	Δ = 07°09'12.1 L = 249.71' T = 125.02'	39" (RT)	7. // A =	22° 16' 16. 49" (L 777. 41' 393. 68'
		B. 9398 W D = 02° 51' 53. PC STA. = 19+ PT STA. = 21+ OU DOD: C740	24" 54.21 53.92	PC PC	02°51′53.24" STA. = 22+83.92 STA. = 30+61.33
		CH B&D = 574. 249.	N1750054		772.53
234		APPROX. LOCA. CI	TY LIMIT LINE	Л, / /т	[]
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ABSTRACT			D LINE	/	
342 à					
I			PSON REP		
			AMDE		CITY OF HOUS
SURVEY CONTROL MONUMENT TABLE MONUMENT NORTHING EASTING ELEV. DESCRIPTION BASELINE STA	TION/OFFSET BEARING & DISTANCE		CITY E	OF HOL	PPROX. LOON
234 10,026,250.22 3,904,984.76 82.66' FND.5/8"I.R. W/TxDOT ALUMINUM CAP OUTSIDE OF PR	ROJECT LIMITS	MARY OWENS SURVEY		THOUSTON	
202 10,026,000.50 3,905,938.46 83.84′ FND.5/8"I.R. W/TxDOT ALUMINUM CAP 18+01.93 /	36.82′ RT. S78°17′44″E 1.049.81	ABSTRACT 405	о Ч <u>N1750054</u>		
204 10,025,787.53 3,906,966.44 82.56' FND.5/8"I.R. W/TxDOT ALUMINUM CAP 28+53.04 /	13.26' RT. N85°15'24"E 890.51'		or the second se		
206 10,025,861.17 3,907,853.90 78.51' FND.5/8"I.R. W/TxDOT ALUMINUM CAP 37+42.19 /	23.06' LT. N87°07'26"E 974.72'				
208 10,025,910.08 3,908,827.39 80.42' FND.CITY OF HOUSTON MONU.5670-8614 47+16.90 /	19.12' LT. N86° 42' 57"E 1,026.37	4	· // /		
210 10,025,906.00 5,909,052.01 19.44 FND.578 L.K. W/IXUUI ALUMINUM CAP 57+43.26 /	22.21 L1. N86° 52' 22"E 1,000.16	·	J		
214 10,026,074.59 3,911,851.92 78.10' FND.5/8"I.R. W/TxDOT ALUMINUM CAP 77+45.83 /	N87° 04′ 31″E 1,002.49 21.24′ LT.				
216 10,026,117.20 3,912,842.17 73.71′ FND.5/8″I.R. W/TxDOT ALUMINUM CAP 87+36.96 /	N87° 32' 10"E 991.17'	]//	<i>▼</i> /		
232 10,026,251.55 3,913,863.26 71.24′ FND.5/8″I.R. W/TxDOT ALUMINUM CAP 97+63.55 /	N82° 30′ 16″E 1,029.89 96.16′ LT.	MONUMENT NORTHING EAST	SURVEY CONT	TROL MONUMENT TABLE	SELINE STATION/
229 10,026,360.41 3,914,865.60 72.91/ FND.5/8"I.R. W/T×DOT ALUMINUM CAP 107+70.11 /	N83° 48' 06"E 1,008.23 154.14' LT.	N1750052 10,025,229.51 3,906,	729.48 80.83' FND.5/8"I.R. W/	TXDOT ALUMINUM CAP 20	6+91.66 / 590.8
227 10,026,278.19 3,915,875.90 73.27′ FND.5/8"I.R. W/TxDOT ALUMINUM CAP 117+74.95 /	20.89' LT. N87° 12' 14"F 1 029 04	N1750053 10,026,420.70 3,907,0	025.77 79.18' FND.5/8"I.R. W/	TXDOT ALUMINUM CAP 21	8+93.21 / 621.80
225 10,026,328.39 3,916,903.71 73.04′ FND.5/8"I.R. W/T×DOT ALUMINUM CAP 128+03.99 /	19.00' LT.	N1750054 10,026,353.53 3,916,4	123.28 73.14' FND.5/8"I.R. W/	TXDOT ALUMINUM CAP 12	23+25.45 / 68.4
		N1750055 10,025,367.61 3,916,5	514.97 70.96' FND.5/8"I.R. W/	TXDOT ALUMINUM CAP 12	23+67.11 / 920.8






- ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, (EPOCH 2010.00). ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00003.
- 2. ALL COORDINATES AND DISTANCES ARE IN U.S. SURVEY FEET.
- ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), USING GEOID 18.
- ALL PROJECT CONTROL WAS TIED UTILIZING THE TXDOT VRS NETWORK AND HOLDING BASE STATION CONROE (TXCN).
- 5. BASELINE STATIONS AND OFFSETS SHOWN HEREON ARE REFERENCED TO THE PROPOSED RIGHT-OF-WAY BASELINE WHICH MAY NOT MATCH THE PROPOSED CONSTRUCTION BASELINE OR AS-BUILT BASELINE DUE TO DESIGN CHANGES.



04/6/2021

#### SURVEYOR CERTIFICATION

THE CONTROL POINTS SHOWN HEREON WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.



THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

#### NORTHPARK DRIVE

SURVEY CONTROL INDEX SHEET

S	HEET	3 of	3	

ENGINEERS, S	UNCEYORS, PLANNERS	9960 Wes Parkway S Housto 713 www.mc TBPELS Fi No. 1	t Sam Houston outh, Suite 200 n, TX 77099 .659.0021 kimcreed.com rm Registration 101776-00
C 20	Texas De 70 of Trans	epartri portai	nent tion
FED. ROAD DIV. NO.	FEDERAL AID PROJE	CT NO.	SHEET NO.

FED. ROAD DIV. NO.	FEDERA	SHEET NO.		
6		188		
STATE	STATE DIST.NO.	COUN	HIGHWAY NO.	
TEXAS	12	MONTGO	NORTHPARK	
CONSTRUC		CONT. SECT.		JOB
CONSTRUC	.1100	0912	37	232





#### MAINLANES

<u>B northpark</u>					
Beginning chain NOF	RTHPARK descrip	tion			
Point NP1001	N 10,026,3	49.0258 E	E 3,904,4	77.0658	Sta 3+00.00
Course from NP1001	to PC NORTHPAR	K1 S 77°	59′25.47"	E Dist	1,634.2129
		Curve I	Data *		
Curve CNP-1 P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chard =	20+59,23 7° 09' 12.89" 2° 51' 53.24" 125.0160 249.7070 2,000.0000 3.9034 249.5449	N 1 (RT)	10,025,982.	9736 E	3, 906, 197. 7900
Mid. Ord. = P.C. Station P.T. Station C.C. Back = S 77 Ahead = S 77 Chord Bear = S 74	3.8958 19+34.21 21+83.92 7* 59' 25.47" E 9* 50' 12.59" E 1* 24' 49.03" E	N 1 N 1 N 1	10,026,008. 10,025,941. 10,024,052.	9863 E 9359 E 7607 E	3,906,075.5103 3,906,315.8786 3,905,659.3595
Course from PT NOR1	HPARKI to PC N	ORTHPARK2	2 S 70° 50′	12.59"	E Dist 100.0010
		Curve I	Data		
Curve CNP-2 P.I. Station Delta = Degree = Tangent = Length = Padius =	26+77.60 22° 16′ 16.49" 2° 51′ 53.24" 393.6759 777.4132	N 1 (LT)	10,025,779.	8817 E	3,906,782.1997
Radius = External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = S 70 Ahead = N 86 Chord Bear = S 81	2,000,0000 38,3770 772,5282 37,6545 22+83,92 30+61,33 9 50' 12.59" E 53' 30,92" E	N 1 N 1 N 1	10,025,909. 10,025,801. 10,027,798.	1096 E 2266 E 2847 E	3,906,410.3383 3,907,175.2965 3,907,066.8574
Course from PI NOR	HPARK2 to NP10	02 N 86°	53' 30.92"	F Dist	4, 172, 7838
Point NP1002	N 10,026.0	27.4732 E	E 3,911,3	41,9424	Sta 72+34.12
Course from NP1002	to NP1003 N 87	• 05′ 54.	.50" E Dist	1,965.8	3820
Point NP1003	N 10,026,1	26.9853 E	E 3,913,3	05.3041	Sta 92+00.00
Endina chain NORTHF	ARK descriptio				

#### FRONTAGE ROADS

#### <u>B</u> WBFR

Beginning chain WBFR description

	Curve	Data		
Curve WBFR1 9.I. Station 201+51.64 Pelta = 3° 54′ 22.87" Dearee = 4° 35′ 01.18"	N (LT)	10,026,091.4731	E	3,905,932.8628
Iangent   =   42.6282     ength   =   85.2234     Radius   =   1,250.0000     External   =   0.7267     ong Chord   =   85.2069				
01.1     -     01.7262       0.2     Station     201+09.01       2.1     Station     201+94.23       2.2     Sack     =     S 77° 59′ 25.47″ E       Ahead     =     S 81° 53′ 48.35″ E     Shead       Chord Bear     =     S 79° 56′ 36.91″ E	N N N	10,026,100.3430 10,026,085.4644 10,027,322.9840	E E E	3,905,891.1676 3,905,975.0655 3,906,151.2619

Course from PT WBFR1 to PC WBFR2 S 81° 53' 48.34" E Dist 101.4622

	Curve	Data	
Curve WBFR2 P.I. Station 204+27.57 Delta = 10° 02′ 54.91" Degree = 3° 49′ 10.99" Tangent = 131.8739 Length = 263.0714 Radius = 1.500,0000	N (RT)	10,026,052.5740	E 3,90
External     =     5.7857       Long Chord     =     262.7344       Mid. Ord.     =     5.7635       P.C. Station     202+95.70       P.T. Station     205+58.77       C.C.     Back     =       Ahead     =     53' 48.35"       Chord Bear     =     71° 50' 53.43"       E     576 52' 20.89"     E	N N N	10,026,071.1626 10,026,011.4905 10,024,586.1390	E 3,9 E 3,9 E 3,9
Course from PT WBFR2 to PC WBFR3 S	71° 50	)' 53.43" E Dist	142.2223
	Curve *	Data *	
Curve WBFR3 P.I. Station 210+62.66 Delta = 21° 15′ 35.64" Degree = 2° 58′ 23.93" Tangent = 361.6709 Length = 715.0235 Radius = 1,927.0000 External = 33.6465 Long Chord = 710 9287	N (LT)	10,025,854.5096	E 3,90
Wid. Ord.     =     33.0691       P. C. Station     207+00.99       P. T. Station     214+16.01       C. C.     Back     =     50' 53.43" E       Ahead     =     N 86° 53' 30.92" E     Chord Bear     =     82° 28' 41.25" E	N N N	10,025,967.1832 10,025,874.1193 10,027,798.2847	E 3,90 E 3,90 E 3,90
Course from PT WBFR3 to PC WBFR4 N	86° 53	3′ 30.92" E Dist	834.6874
	Curve *	Data *	
Curve WBrk4         P.I. Station       223+19.50         Delta       =       5° 15' 07.67"         Degree       =       3° 49' 10.99"         Tangent       =       68.7984         Length       =       137.5005         Radius       =       1,500.0000	N (RT)	10,025,923.1059	E 3,9
Long Chord     =     1,5769       Long Chord     =     1,5753       P.C. Station     222*50.70       P.T. Station     223*88.20       C.C.     Back     =       Back     =     N     86°     53'     30.92" E       Ahead     =     S 87°     51'     21.41" E	N N N	10,025,919.3757 10,025,920.5320 10,024,421.5821	E 3,9 E 3,9 E 3,9
Course from PT WBFR4 to PC WBFR5 S	87° 51	′ 21.41" E Dist	190.0418
	Curve *	Data *	
Curve WBFR5       P.I. Station     226+47.13       Delta     5° 15' 07.67"       Degree     3° 48' 52.68"       Tangent     68.8901       Length     137.6838       Radius     1,502.0000       External     1.5790       Long Chord     137.6356	N (LT)	10,025,910.8448	E 3,94
			F 30
P.C. Station 225+78.24 P.T. Station 227+15.93 C.C. Back = S 87° 51′ 21.41″ E Ahead = N 86° 53′ 30.92″ E Chord Bear = N 89° 31′ 04.76″ E	N N N	10, 025, 913, 4221 10, 025, 914, 5800 10, 027, 414, 3706	E 3,9 E 3,9 E 3,9



#### <u>B</u>EBFR

Curve Data		
Curve CEB-1 P.I. Station 299+26.65 N 10,026,039.310 Delta = 9° 30′ 53.21″ (RT) Degree = 3° 49′ 10.99″ Tangent = 124.8352	6 E	3,905,736.5538
Length = 249.0964 Radius = 1,500.0000 External = 5.1856 Long Chord = 248.8102 Mid. Ord. = 5.1678 N 10,026,054.408 P.C. Station 298+01.81 N 10,026,003.936 C.C. N 10,024,565.418; Back = S 83° 03′ 13.28″ E Ahead = S 73° 32′ 20.07″ E Chord Bear = S 78° 17′ 46.68″ E	0 E 8 E 2 E	3, 905, 612, 6349 3, 905, 856, 2723 3, 905, 431, 2261
Course from PT CEB-1 to PC CEB-2 S 73° 32' 20.07" E Dis	† 364.051	5
Curve Data **		
Curve CEB-2 P.I. Station 304+60.41 N 10,025,887.899 Delta = 2° 42′ 07.49″ (RT) Degree = 2° 58′ 23.93″ Tangent = 45.4473 Length = 90.8777 Perduce = 1.037.0000	5 E	3,906,248.9867
Radius     =     1,927.0000       External     =     0.5359       Long Chord     =     90.8693       Mid. Ord.     =     0.5357       P.C. Station     304+14.96     N     10,025,900.7771       P.T. Station     305+05.84     N     10,025,872.9810       C.C.     N     10,024,052.760       Back     =     S 73° 32′ 20.07"     E       Ahead     =     S 70° 50′ 12.59"     E       Chord Bear     =     S 72° 11′ 16.33"     E	6 E 0 E 7 E	3,906,205.4022 3,906,291.9156 3,905,659.3595
Course from PT CEB-2 to PC CEB-3 S 70° 50' 12.59" E Dis	+ 100.001	0
Curve Data **		
Curve CEB-3 P.I. Station 310+13.88 N 10,025,706.2100 Delta = 22° 16′ 16.49″ (LT) Degree = 2° 45′ 50.06″ Tangent = 408.0451 Length = 805.7888 Performed	0 E	3,906,771.8097
Radius     =     2,073.0000       External     =     39.7777       Long Chord     =     800.7255       Mid. Ord.     =     39.0288       P.C. Station     306+05.84     N     10,025,840.154       P.T. Station     314+11.63     N     10,025,728.3340       C.C.     N     10,027,798.284       Back     =     S 70° 50′ 12.59" E       Anead     =     N 86° 53′ 30.92" E	7 E 0 E 7 E	3, 906, 386. 3754 3, 907, 179. 2546 3, 907, 066. 8574
Chord Bear = S 81° 58′ 20.83" E	+ 667 460	7
Chord Bear = S 81° 58′ 20.83″ E Course from PT CEB-3 to PC CEB-4 N 86° 53′ 30.92″ E Dis	+ 663.462	3
Chord Bear = S 81° 58′ 20.83" E Course from PT CEB-3 to PC CEB-4 N 86° 53′ 30.92" E Dis Curve Data **	† 663.462	3
Chord Bear = S 81° 58′ 20.83" E Course from PT CEB-3 to PC CEB-4 N 86° 53′ 30.92" E Dis Curve Data ** Curve CEB-4 P.I. Station 321+23.85 N 10,025,766.950 Delta = 3° 43′ 25.25" (LT) Degree = 3° 49′ 10.99" Tangent = 48.7600 Length = 97.4857 Radius = 1,500.0000 External = 0.7923 Long Chord = 97.4686	+ 663.462 4 E	3 3, 907, 890. 4293

Course from PT CEB-4 to PC CEB-5 N 83° 10' 05.67" E Dist 87.2524

		*	*	
Curve CEB-5 P.I. Station Delta = Degree = Tangent =	323+08.59 3° 43′ 25.25" 3° 49′ 10.99" 48.7600	N 1 (RT)	0,025,788.9299	E :
Length = Radius = External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = N Ahead = N	97.4857 1,500.0000 0.7923 97.4686 0.7919 322+59.83 323+57.31 83* 10' 05.67" E 86* 53' 30.92" E 85* 01' 48.30" E	N 1 N 1 N 1	0, 025, 783. 1297 0, 025, 791. 5737 0, 024, 293. 7801	E E E
Course from PT C	EB-5 to PC CEB-6 N	186° 53′	30.92" E Dist	163.9609
		Curve [	)ata	
Curve CEB-6 P.I. Station Delta = Degree = Tangent = Length = Perfus	325+49.27 2°08′18.38″ 3°49′10.99″ 27.9953 55.9842	N 1 (LT)	0,025,801.9814	E :
External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = N	0.2612 55.9809 0.2612 325+21.27 325+77.26 86* 53' 30.92" E 84* 45' 12.55" F	N 1 N 1 N 1	0,025,800.4635 0,025,804.5414 0,027,298.2571	E E
Chord Bear = N	85° 49′ 21.73" E			
Course from PT C	EB-6 to PC CEB-7 N	184°45′	12.55" E Dist	51,2074
		Curve E	)ata *	
Curve CEB-7 P.I. Station Delta = Degree = Tangent = Length =	326+56.46 2°08′18.38″ 3°49′10.99″ 27.9953 55.9842	N 1 (RT)	0,025,811.7837	E :
Length     =       Radius     =       External     =       Long Chord     =       P.C. Station     =       P.T. Station     =       C.C.     Back     =       Ahead     =     N       Chord Bear     =     N	1,500,0000 0,2612 55,9809 0,2612 326+28,46 326+84,45 84* 45' 12,55" E 86* 53' 30,92" E 85* 49' 21,73" F	N 1 N 1 N 1	0,025,809.2238 0,025,813.3016 0,024,315.5081	E E E

Curve Data

Ending chain EBFR description



#### <u>U-TURNS</u>

#### <u>BEBU-TURN</u>

Beginning chain EBUTURN description					
		Curve	Data		
Curve EBUTURN-1 P.I. Station Delta = Degree = Tangent = Length = Radius = External =	600+25.00 1* 23' 53.30" 2* 47' 46.61" 25.0012 50.0000 2,049.0000 0.1525 49.9888	N (LT)	10,025,781.1082	Ε	3,906,706.2679
Mid. Ord. = P.C. Station P.T. Station C.C. Back = S 75 Abend = S 87	0.1525 600+00.00 600+50.00 9° 09' 56.93" E	N N N	10,025,785.8076 10,025,777.0093 10,027,798.2847	E E E	3,906,681.7123 3,906,730.9308 3,907,066.8574
Chord Bear = S 79	9° 51′ 53.59" E				
CURVA EPUTUPN-2		Curve *	Data *		
P.I. Station Delta = Tangent = Length = Radius = External =	600+96,96 85" 16' 33,24" 112" 20' 40,80" 46,9593 75,9056 51,0000 18,3266	N (LT)	10,025,769.3105	E	3, 906, 777. 2547
Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = S 80 Ahead = N 14 Chord Dage = N 14	69.0911 13.4819 600+50.00 601+25.91 0° 33' 50.24" E 4° 09' 36.53" E	N N N	10,025,777.0093 10,025,814.8429 10,025,827.3192	E E E	3, 906, 730. 9308 3, 906, 788, 7425 3, 906, 739. 2921
Course from PT EBU	6° 47 53.14 E TURN_2 to PC EBU	ITURN_3	N 14° 09' 36.53"	'E Dist	8.0274
000,00 H 0 ED0	LOUILLE IO IO EDO				0.02.
		Curve	Data		
Curve EBUTURN-3 P.I. Station Delta = Degree = Tangent = Length = Radius =	601+89,34 94*44′35,29" 112*20′40,80" 55,4069 84,3326 51,0000 24 3655	Curve * N (LT)	Data * 10,025,876.3498	E	3,906,804.2606
Curve EBUTURN-3 P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = N 14 Ahead = N 88 Chord Berge = N 81	601+89,34 94* 44' 35.29" 112* 20' 40.80" 55.4069 84.3326 51.0000 24.3055 75.0476 16.4607 601+33.93 602+18.27 4* 09' 36.53" E 0* 34' 58.76" W	Curve * N (LT) N N N	Data * 10,025,876.3498 10,025,822.6264 10,025,885.4154 10,025,835.1027	E E E E	3, 906, 804. 2606 3, 906, 790. 7063 3, 906, 749. 6004 3, 906, 741. 2559
Curve EBUTURN-3 P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = N 14 Ahead = N 83	601+89,34 94* 44' 35.29" 112* 20' 40.80" 55.4069 84.3326 51.0000 24.3055 75.0476 16.4607 601+33.93 602+18.27 4* 09' 36.53" E 0* 34' 58.76" W 3* 12' 41.12" W	Curve * N (LT) N N N Curve	Data 10,025,876.3498 10,025,822.6264 10,025,885.4154 10,025,835.1027 Data	E E E	3, 906, 804. 2606 3, 906, 790. 7063 3, 906, 749. 6004 3, 906, 741. 2559
Curve EBUTURN-3 P.I. Station Delta = Degree = Tangent = Length = External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = N 14 Ahead = N 83 Chord Bear = N 33 Curve EBUTURN-4 P.I. Station Delta = Degree = Tangent = Length = Radius =	601+89, 34 94* 44' 35.29" 112* 20' 40.80" 55.4069 84.3326 51.0000 24.3055 75.0476 16.4607 601+33.93 602+18.27 4* 09' 36.53" E 0* 34' 58.76" W 3* 12' 41.12" W 602+43.27 1* 28' 38.84" 2* 57' 17.69" 25.0014 50.0000 1.939.0000	Curve N (LT) N N N Curve *	Data 10,025,876.3498 10,025,822.6264 10,025,885.4154 10,025,835.1027 Data *	E E E E	3, 906, 804. 2606 3, 906, 790, 7063 3, 906, 749, 6004 3, 906, 741, 2559 3, 906, 724, 9360
Curve EBUTURN-3 P.I. Station Delta = Degree = Radius = External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = N 14 Ahead = N 80 Chord Bear = N 33 Curve EBUTURN-4 P.I. Station Delta = Degree = Tangent = Length = External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. Back = N 80 Mid. Ord. = P.C. Station P.T. Station C.C. Back = N 80 Ahead = N 75 Chord Bear = N 75	601+89,34 94* 44' 35.29" 112* 20' 40.80" 55.4069 84.3326 51.0000 24.3055 75.0476 16.4607 602+18.27 4* 09' 36.53" E 0* 34' 58.76" W 3* 12' 41.12" W 602+43.27 1* 28' 38.84" 2* 57' 17.69" 50.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,939.0000 1,930.0000	Curve * N (LT) N N Curve * N (RT) N N N	Data 	E E E E E E E E	3, 906, 804. 2606 3, 906, 790. 7063 3, 906, 749. 6004 3, 906, 741. 2559 3, 906, 724. 9360 3, 906, 724. 9360

#### <u>B</u> WB U-TURN

Beginning chain WBUTURN descriptic	)n =======		
Point WBUTURN1 N 10,025,85	7.3628	E 3,907,305.38	96 Sta
Course from WBUTURN1 to PC WBUTURN	I_1 S 86	• 53′ 30.92" W D	ist 50.000
	Curve	Data	
Curve WBUTURN-1 P.I. Station 701+00.63 Delta = 89° 35′ 01.05″ Degree = 112° 20′ 40.80″ Tangent = 50.6307 Length = 79.7400 Radius = 51.0000	N (LT)	10,025,851.9067	E 3,
External = 20.8642 Long Chord = 71.8623 Wid. Ord. = 14.8068 P.C. Station 700+50.00 P.T. Station 701+29.74 C.C. = 5.86° 53′ 30.92″ W	N N N	10,025,854.6518 10,025,801.3318 10,025,803.7269	E 3, 9 E 3, 9 E 3, 9
Ahead = S 2° 41′ 30.13" E Chord Bear = S 42° 06′ 00.40" W			
Course from PT WBUTURN_1 to PC WBU	TURN_2	S 2° 41′ 30.13"	E Dist 5.0
	Curve	Data	
Curve WBUTURN-2 P.I. Station 701+86.11 Delta = 90° 24' 58.95" Degree = 112° 20' 40.80" Tangent = 51.3720 Length = 80.4812 Radius = 51.0000 External = 21.3884	N (LT)	* 10,025,745.0219	E 3,9
Long Chord = 72.3865 Wid. Ord. = 15.0688 P.C. Station 701+34.74 P.T. Station 702+15.22 C.C. Back = S 2° 41′ 30.13″ E	N N N	10,025,796.3372 10,025,747.8073 10,025,798.7322	E 3,9 E 3,9 E 3,9
Anead = N 86° 53' 30.92" E Chord Bear = S 47° 53' 59.60" E			
Course from PT WBUTURN_2 to WBUTUR	N8 N 86	• 53′ 30.92" E D	ist 50.000
Point WBUTURN8 N 10,025,75	0.5182	E 3,907,311.15	48 Sta
Ending chain WBUTURN description			
INTERSECTING STREETS			

### <u> B LOOP 494</u>

Beginning chain LOOP_4	494	description		
Point LP4941001	Ν	10,024,414.7554	Е	3,906,549.7084 Sta
Course from LP4941001	to	LP4941002 N 14°	111	18.10" E Dist 2,899.99
Point LP4941002	N	10,027,226.2905	Е	3,907,260.5285 Sta
Ending chain LOOP_494	des	scription		

#### <u>B</u> ANDERSON RD

Beginning chain ANDERSONRD description	
Point ANDERSONRD1001 N 10,025,324.0619 E	3,906,957.7601 Sta
Course from ANDERSONRD1001 to ANDERSONRD1002	N 14° 25′ 34.23" E Dist
Point ANDERSONRD1002 N 10,025,725.2931 E	3,907,060.9741 Sta
naing chain ANDERSONRU description	



#### <u>SIDEPATH</u>

#### <u>B\_\_\_\_\_01</u>

Beginning chain	SWEB_01 description				
		Curve	Data		
Curve SWEB_01_1 P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chord =	500+43.81 37° 14′ 55.29" 44° 04′ 25.24" 43.8113 84.5146 130.0000 7.1839 83.0341	N (RT)	10,026,275.5440	E	3, 904, 539. 1261
Mid. Ord. = P.C. Station P.T. Station C.C. Back = S Ahead = S Chord Bear = S	6.8077 500+00.00 500+84.51 77° 06' 21.11" E 39° 51' 25.82" E 58° 28' 53.46" E	N N N	10,026,285.3205 10,026,241.9124 10,026,158.5986	E E E	3,904,496.4196 3,904,567.2038 3,904,467.4100
		Curve *	Data		
Curve SWEB_01_2 P.I. Station Delta = Degree = Tangent = Length = Radius = External =	501+40.62 52° 24′ 24.36" 50° 15′ 34.04" 56.1033 104.2725 114.0000 13.0574	N (LT)	10,026,198.8450	Ε	3, 904, 603. 1591
Mid. Ord. = P.C. Station P.T. Station C.C. Back = S	100.6754 11.7155 500+84.51 501+88.79 39° 51′ 25.82″ E	N N N	10,026,241.9124 10,026,201.0613 10,026,314.9723	E E E	3,904,567.2038 3,904,659.2186 3,904,654.7152
Ahead = N Chord Bear = S	87° 44′ 09.82" E 66° 03′ 38.00" E		Data		
Curve SWEB_01_3		*	*		
P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chord = Wid Ord =	502+34.14 28° 19' 16.58" 31° 52' 20.75" 45.3564 88.8582 179.7660 5.6336 87.9563 5 4624	N (RT)	10,026,202.8530	E	3, 904, 704. 5396
P.C. Station P.T. Station	501+88.79 502+77.65	N N N	10,026,201.0613 10,026,182.9293 10,026,021,4356	E E F	3,904,659.2186 3,904,745.2857 3,904,666,3199
Back = N Ahead = S Chord Bear = S	87° 44′ 09.82" E 63° 56′ 33.60" E 78° 06′ 11.89" E			L	5, 50 1, 0001 51 55
		Curve *	Data *		
Curve SWEB_01_4 P.I. Station Deita = Degree = Tangent = Length = Radius = External = Long Chord =	503+51.51 42° 52′ 56.80″ 30° 27′ 49.70″ 73.8632 140.7652 188.0782 13.9841 137.5027	N (LT)	10,026,149.3903	Ε	3,904,811.0953
P.C. Station P.T. Station	502+77.65 504+18.41	N N	10,026,182.9293 10,026,169.5978	E E	3,904,745.2857 3,904,882.1406
C.C. Back = S Ahead = N Chord Bear = S	62° 59′ 41.92" E 74° 07′ 21.28" E 84° 26′ 10.32" E	N	10,026,350.5007	E	3, 904, 830. 6861
		Curve *	Data *		
Curve SWEB_01_5 P.I. Station Delta = Degree = Iangent = Length = Radius = External = Long Chord =	504+55,72 25* 39' 07.40" 34* 58' 01.76" 73.3604 163.8560 4.1931 72.7493	N (RT)	10,026,179.8039	E	3,904,918.0228
Mid. Ord. = P.C. Station P.T. Station C.C. Back = N Ahead = S Chord Bear = N	4.0884 504+18.41 504+91.77 74° 07′ 21.28" E 80° 13′ 31.33" E 86° 56′ 54.97" E	N N N	10,026,169.5978 10,026,173.4704 10,026,011.9931	E E E	3,904,882.1406 3,904,954.7867 3,904,926.9683

Course from PT SWEB_01_5 to 33 S 8	0° 17′ 37.01" E Dist 6.0000
Point 33 N 10,026,17	2.4588 E 3,904,960.7008 Sta
Course from 33 to 34 S 76° 28' 32.	46" E Dist 74.4958
Point 34 N 10,026,15	5.0374 E 3,905,033.1309 Sta
Course from 34 to 35 S 77° 57' 54.	51" E Dist 8.0000
Point 35 N 10,026,15	3.3693 E 3,905,040.9551 Sta
Course from 35 to 36 S 78° 25′ 46.	58" E Dist 205.6145
Point 36 N 10,026,11	2.1289 E 3,905,242.3913 Sta
Course from 36 to 37 S 78° 31' 57.	16" E Dist 8.0000
Point 37 N 10,026,11	0.5384 E 3,905,250.2316 Sta
Course from 37 to 38 S 76° 54' 17.	75" E Dist 105.3244
Point 38 N 10,026,08	6.6753 E 3,905,352.8171 Sta
Course from 38 to PC SWEB_01_20 S	77° 59′ 25.48″ E Dist 31.1440
	Curve Data
Curve SWEB_01_20	**
Delta = 19° 57′ 21.98"	N 10,026,075.0700 E 3, (RT)
Degree = 40° 55' 32,00° Tangent = 24,6305	
Length = 48,7619 Radius = 140,0000	
Long Chord = 2.1501	
P.C. Station 509+30.35	N 10,026,080.1950 E 3,
C.C. 509+79.11	N 10,025,062.0303 E 3, N 10,025,943.2592 E 3,
Back = S 77° 59' 25.47" E Ahead = S 58° 02' 03.54" E	
Chord Bear = 5 68° 00' 44.51" E	
	Curve Data **
P.I. Station 510+70.39	N 10,026,013.7101 E 3,
Degree = 23° 52′ 23.67"	([])
Length = 91,2722	
External = 16,7696	
Long Chord = 170.6225 Mid. Ord. = 15.6744	
P. T. Station 509+79.11 P. T. Station 511+53.55	N 10,026,029.0534 E 3,
Back = $558^{\circ}$ 02' 02.18" E	N 10,026,265.6380 E 3,
Ahead = N 80° 19' 20,49" E Chord Bear = S 78° 51' 20,85" E	
	Curve Data
Curve SWEB_01_22	N 10.026.030.2261 E 3
Delta = 21° 06′ 15.97"	(RT)
Tangent = 55.8846	
Radius = 300.0000	
Long Chord = 109.8789	
P.C. Station 511+53.55	N 10,026,029.0534 E 3,
C.C.	N 10,025,734.0655 E 3,
Back = N $79^{\circ} 30^{\circ} 43.15^{\circ} E$ Ahead = S $79^{\circ} 23' 00.88'' E$	
Chord Bedr = 5 89° 56' 08.86" E	Contra Data
	**
P.I. Station 513+20.64	N 10,026,018.5042 E 3,
Degree = 3° 50' 52.57"	
Length = 113.1292	
External = 1,489.0000	
Mid. Ord. = 1.0743	
P.T. Station 513+77.18	N 10,026,023,8862 E 3, N 10,026,003,8862 E 3,
Back = S 79° 23′ 00.88" E	N 10,024,303.4182 E 3,
Chord Bear = 5 77° 12' 25.22" E	



#### **<u>B</u>** SWEB\_01 CONT.

Course from PT SWEB_01_23 to PC SWEB_01_26 S 75° 01' 49.57" E Dist 64.4	669
Curve Data **	
Curve SWEB_01_26 P.I. Station 514+60.58 N 10,025,982.3447 E 3,905, Delta = 19° 31′ 37.50" (RT) Degree = 52° 05′ 13.46" Tangent = 18.9282 Length = 37.4893	896.4085
Radius     =     110,0000       External     =     1,6167       Long Chord     =     37,3081       Mid. Ord.     =     1,5932       P.C. Station     514+41.65     N     10,025,987.2340     E     3,905,       P.T. Station     514+79.14     N     10,025,987.2340     E     3,905,       C.C.     N     10,025,880.9671     E     3,905,	878.1227 912.0084 849.7090
$\begin{array}{rcl} \text{Back} &= & 5 & 75^{\circ} & 01 & 49, 57 & \text{E} \\ \text{Ahead} &= & & 55^{\circ} & 36' & 12' & 07'' & \text{E} \\ \text{Chord Bear} &= & S & 65^{\circ} & 16' & 00, 82'' & \text{E} \end{array}$	
Course from PT SWEB_01_26 to PC SWEB_01_29 S 55° 30′ 12.07" E Dist 28.3	206
Curve Data **	
Curve SWEB_01_29 P.I. Station 515+27.34 N 10,025,944.3261 E 3,905, Delta = 22° 29′ 13.40″ (LT) Degree = 57° 17′ 44.81″ Tangent = 19.8795 Length = 39.2473	951.7329
Radius     =     100.0000       External     =     1.9568       Long Chord     =     38.9959       Mid. Ord.     =     1.9193       P.C. Station     515+07.46     N     10,025,955.5850     E     3,905,       P.T. Station     515+46.71     N     10,025,940.1897     E     3,905,       C.C.     N     10,026,038,0010     E     3,905,	935.3490 971.1773 991.9848
Back = S 55° 30′ 12.07" E Ahead = S 77° 59′ 25.47" E Chord Bear = S 66° 44′ 48.77" E	
Course from PT SWEB_01_29 to PC SWEB_01_32 S 77° 59' 25.47" E Dist 87.7	346
Curve Data	
Curve SWEB_01_32 P.I. Station 517*30.07 N 10,025,902.0362 E 3,906, Delta = 5° 43′ 46.34″ (RT)	150 5276
Degrée = 2° 59′ 53,55″ Tangent = 95,6290 Length = 191,0987 Rodius = 1,911,000	130. 3276
$\begin{array}{rcl} \bar{\text{Degree}} &=& 2^{\circ} & 59' & 53' & 55'' \\ \hline \text{Tangent} &=& 95.6290 \\ \text{Length} &=& 191.0987 \\ \text{Radius} &=& 1,911.0000 \\ \text{External} &=& 2.3912 \\ \text{Long Chord} &=& 191.0190 \\ \text{Mid. Ord.} &=& 2.3882 \\ \text{P.C. Station} & 516 + 34.44 \\ \text{N} & 10,025,921,9343 \\ \text{E} & 3,906, \\ \text{P.T. Station} & 518 + 25.54 \\ \text{N} & 10,025,872.8996 \\ \text{E} & 3,906, \\ \text{C.C.} \\ \text{Rack} &= S & 77^{\circ} & 59' & 25.47'' \\ \text{F.C.} \end{array}$	056. 9916 241. 6098 659. 3595
Degree = 2° 59′ 53.55″ Tangent = 95.6290 Length = 191.0987 Radius = 1,911.0000 External = 2.3912 Long Chord = 191.0190 Mid. Ord. = 2.3882 P.C. Station 516*34.44 N 10,025,921.9343 E 3,906, P.T. Station 516*35.44 N 10,025,872.8996 E 3,906, C.C. N 10,025,872.8996 E 3,906, C.C. N 10,024,052.7607 E 3,905, Back = S 77° 59′ 25.47″ E Ahead = S 72° 15′ 39.14″ E Chord Bear = S 75° 07′ 32.31″ E	056. 9916 241. 6098 659. 3595
$\begin{array}{rcl} \bar{\text{Degree}} &=& 2^{\circ} & 59' & 53.55"\\ Tangent &=& 95.6290\\ \text{Length} &=& 191.0987\\ \text{Radius} &=& 1,911.0000\\ \text{External} &=& 2.3912\\ \text{Long Chord} &=& 191.0190\\ \text{Mid. Ord.} &=& 2.3882\\ \text{P.C. Station} & 516+34.44 & \text{N} & 10,025,921.9343 & \text{E} & 3,906,\\ \text{P.T. Station} & 518+34.44 & \text{N} & 10,025,872.8996 & \text{E} & 3,906,\\ \text{C.C.} && \text{N} & 10,025,872.8996 & \text{E} & 3,906,\\ \text{Gack} &=& \text{S} & 77^{\circ} & 59' & 25.47" & \text{E}\\ \text{Ahead} &=& \text{S} & 72^{\circ} & 15' & 39.14" & \text{E}\\ \text{Chord Bear} &=& \text{S} & 75^{\circ} & 07' & 32.31" & \text{E} \\ \hline \end{array}$	056. 9916 241. 6098 659. 3595 287
$ \begin{array}{rcl} \dot{D}egree & = & 2^{\circ} & 59^{\circ} & 53^{\circ} & 55^{\circ} \\ \hline Tangent & = & & 95^{\circ} & 6290 \\ Length & = & & 191^{\circ} & 0987 \\ Radius & = & & 1,911^{\circ} & 0000 \\ External & = & & 2,3912 \\ Long Chord & = & & 191^{\circ} & 0190 \\ Mid. Ord. & = & & 2,3882 \\ P.C. & Station & & 516^{\circ} & 34.44 \\ P.T. & Station & & 518^{\circ} & 25.47 \\ P.T. & Station & & 518^{\circ} & 25.47^{\circ} \\ Back & = & S & 77^{\circ} & 59^{\circ} & 25.47^{\circ} \\ Ahead & = & S & 72^{\circ} & 15^{\circ} & 39.14^{\circ} \\ Chord Bear & = & S & 75^{\circ} & 07^{\circ} & 32.31^{\circ} \\ \hline Course from PT & SWEB_01_32 & to PC & SWEB_01_35 & 571^{\circ} & 45^{\circ} & 24.25^{\circ} \\ E & Dist & 33.6 \\ \hline \\ \hline \\ \end{array} $	056. 9916 241. 6098 659. 3595 287
$ \begin{array}{rcrcrc} \bar{\text{Degree}} &=& 2^{\circ} \ 59^{\circ} \ 53^{\circ} \ 55^{\circ} \\ \hline \text{Tangent} &=& 95, 6290 \\ \text{Length} &=& 191, 0987 \\ \text{Rodius} &=& 1,911, 0000 \\ \text{External} &=& 2,3912 \\ \text{Long Chord} &=& 191, 0190 \\ \text{Mid. Ord.} &=& 2,3882 \\ \text{P.C. Station} & 518+34, 44 & \text{N} & 10,025,921,9343 & \text{E} & 3,906, \\ \text{P.T. Station} & 518+25,54 & \text{N} & 10,025,872,8996 & \text{E} & 3,906, \\ \text{C.C.} & \text{N} & 10,024,052,7607 & \text{E} & 3,905, \\ \text{Back} &=& \text{S} \ 77^{\circ} \ 59^{\prime} \ 25,47^{\circ} & \text{E} \\ \text{Ahead} &=& \text{S} \ 72^{\circ} \ 15^{\prime} \ 39,14^{\circ} & \text{E} \\ \text{Chord Bear} &=& \text{S} \ 75^{\circ} \ 07^{\prime} \ 32,31^{\circ} & \text{E} \\ \hline \text{Course from PT SWEB_01_32 to PC SWEB_01_35 S \ 71^{\circ} \ 45^{\prime} \ 24,25^{\circ} & \text{E} \ \text{Dist} \ 33,60 \\ \hline & & & & & & & & & & & & & & & & & &$	056. 9916 241. 6098 659. 3595 287 280. 1140
$\begin{array}{rcrcrc} \bar{\text{Degree}} &=& 2^{\circ} & 59^{\circ} & 53^{\circ} & 55^{\circ} \\ \hline \text{Tangent} &=& 95, 6290 \\ \text{Length} &=& 191, 0987 \\ \text{Rodius} &=& 1,911, 0000 \\ \text{External} &=& 2,3912 \\ \text{Long Chord} &=& 191, 0190 \\ \text{Mid. Ord.} &=& 2,3882 \\ \text{P.C. Station} & 518+25.54 & \text{N} & 10,025,921,9343 & \text{E} & 3,906, \\ \text{P.T. Station} & 518+25.54 & \text{N} & 10,025,872.8996 & \text{E} & 3,906, \\ \text{C.C.} & \text{N} & 10,024,052.7607 & \text{E} & 3,905, \\ \text{Back} &=& \text{S} & 77^{\circ} & 59^{\circ} & 25.47^{\circ} & \text{E} \\ \text{Ahead} &=& \text{S} & 72^{\circ} & 15^{\circ} & 39.14^{\circ} & \text{E} \\ \text{Chord Bear} &=& \text{S} & 75^{\circ} & 07^{\circ} & 32.31^{\circ} & \text{E} \\ \hline \text{Course from PT SWEB_01_32 to PC SWEB_01_35 S & 71^{\circ} & 45^{\prime} & 24.25^{\circ} & \text{E Dist } 33.6 \\ \hline & & & & & & & & & & & & & & & & & &$	056. 9916 241. 6098 659. 3595 287 280. 1140 273. 5482 286. 6635 659. 3595

Course from PT SWEB\_01\_35 to PC SWEB\_01\_38 S 70° 50' 12.58" E Dist 100.0010

	Curve Data			
Curve SWEB_01_38 P.I. Station 520+25.21 Delta = 2° 51' 41.93" Degree = 2° 44' 33.85" Tangent = 52.1786 Length = 104.3355 Radius = 2,089.0000 External = 0.6516	N 10,025,807.9132 E 3,9 (LT)			
	N 10,025,825.0413 E 3,9 N 10,025,793.2671 E 3,9 N 10,027,798.2847 E 3,9			
Course from PT SWEB_01_38 to PC SW	EB_01_41 S 88° 54′ 59.52" E Dist 7			
	Curve Data			
Curve SWEB_01_41 P.I. Station 522+36.65 Delta = 8° 18' 34.63" Degree = 2° 44' 43.32" Tangent = 151.6049 Length = 302.6781 Radius = 2,087.0000 External = 5.4992 Long Chord = 302.4129	N 10,025,751.0845 E 3,9 (LT)			
Mid. Ord.     =     5.4848       P.C. Station     520+85.04       P.T. Station     523+87.72       C.C.     Back     =       Back     =     S 73° 54′ 06.66″ E       Ahead     =     S 82° 12′ 41.30″ E       Chord Bear     =     S 78° 03′ 23.98″ E	N 10,025,793.1220 E 3,9 N 10,025,730.5394 E 3,9 N 10,027,798.2868 E 3,9			
	Curve Data			
Curve SWEB_01_42       524+07.63         P.I. Station       524+07.63         Delta       48° 26′ 59.11″         Degree       129° 26′ 57.03″         Tangent       19.9149         Length       37.4276         Radius       44.2612         External       4.2739         Long Chord       36.3224	N 10,025,727.8406 E 3,9 (RT)			
Mid. Ord.     =     3.8976       P.C. Station     523+87.72       P.T. Station     524+25.15       C.C.     Back     =       Back     =     S 82° 12′ 41.30″ E       Ahead     =     S 33° 45′ 42.19″ E       Chord Bear     =     S 57° 59′ 11.74″ E	N 10,025,730.5394 E 3,9 N 10,025,711.2843 E 3,9 N 10,025,686.6865 E 3,9			
Course from PT SWEB_01_42 to PC SW	EB_01_45 S 26° 38′ 40.82" E Dist 1			
	Curve Data			
Curve SWEB_01_45 P.I. Station 524+56.48 Delta 28° 30' 12.64" Degree = 115° 44' 56.58" Tangent = 24.6253 Radius = 49.5000 External = 1.5718 Long Chard = 24.3721	N 10,025,682.3369 E 3,9 (RT)			
Mid. Ord.     =     1.5234       P.C. Station     524*43.90       P.T. Station     524*68.53       C.C.     Back     =       Back     =     S     14°     18′     54.54"       Ahead     =     S     14°     11′     18.10"     W       Chord Bear     =     S     0°     03′     48.22"     E	N 10,025,694.5195 E 3,9 N 10,025,670.1474 E 3,9 N 10,025,682.2804 E 3,9			
Course from PT SWEB_01_45 to 39 S	14° 11′ 18.10" W Dist 75.1609			
Point 39 N 10,025,597.2793 E 3,906,804.8401 Sta				

Ending chain SWEB\_01 description



#### <u>B</u> SWEBO2

<u> B SWWB01</u>	
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Beginning chain SWEB_02 description	on			
Point SWEB2001 N 10.025.6	99.0063	E 3.906.913.42	11 Sta	625+00.00
Course from SWEB2001 to PC SWEB_0	21 S 84	° 54′ 16.57" E Di	st 38.1	138
	Curve	Data		
Curve SWEB_021         P.I. Station       625+42.12         Delta       9° 09' 24.71"         Degree       114° 35' 29.61"         Tangent       4.0040         Length       7.9909         Radius       50.0000         External       0.1601	N (RT)	10,025,695.2656	Ε	3,906,955.3724
Long Chord = 7.9824 Mid. Ord. = 0.1596 P.C. Station 625+38.11 P.T. Station 625+46.10 C.C. Back = S 84° 54' 16.57" E Ahead = S 75° 44' 51.86" E Chord Bear = S 80° 19' 34.21" E	N N N	10,025,695.6212 10,025,694.2799 10,025,645.8188	E E E	3,906,951.3843 3,906,959.2532 3,906,946.9436
Course from PT SWEB_021 to PC SWE	B_022 S	75° 44′ 51.86" E	Dist 2	7.4657
	Curve *	Data *		
Curve SWEB_022         P.I. Station       625*83.69         Delta       28° 23′ 20.07"         Degree       143° 14′ 22.02"         Tangent       10.1174         Length       19.8192         Radius       40.0000         External       1.2597         Long Chord       19.6171	N (LT)	10,025,685.0272	Ε	3,906,995.6795
Mid. Ord. = 1.2212 P.C. Station 625+73.57 P.T. Station 625+93.39 C.C. Back = S 75° 44' 51.86" E Ahead = N 75° 51' 48.07" E Chord Bear = S 89° 56' 31.89" E	N N N	10,025,687.5181 10,025,687.4983 10,025,726.2869	E E E	3,906,985.8735 3,907,005.4905 3,906,995.7211
Course from PT SWEB_022 to PC SWE	B_023 N	75° 51′ 48.07" E	Dist 8	4.0016
Course from PT SWEB_022 to PC SWE	B_023 N Curve	75° 51′ 48.07" E Data	Dist 8	4.0016
Course from PT SWEB_022 to PC SWE Curve SWEB_023 P.I. Station 626+83.21 Delta = 13° 16′ 16.85" Degree = 114° 35′ 29.61" Tangent = 5.8167 Length = 11.5814 Radius = 50.0000 External = 0.3372	B_023 N Curve * N (RT)	75° 51′ 48.07" E Data * 10,025,709.4351	Dist 8 E	4.0016 3,907,092.5889
Course from PT SWEB_022 to PC SWE Curve SWEB_023 P.I. Station 626*83.21 Delta = 13° 16' 16.85" Degree = 114° 35' 29.61" Tangent = 5.8167 Length = 11.5814 Radius = 50.0000 External = 0.3372 Long Chord = 11.5556 Mid. Ord. = 0.3349 P.C. Station 626*77.39 P.T. Station 626*88.97 C.C. Back = N 75° 51' 48.07" E Ahead = N 89° 08' 04' 92" Chord Bear = N 82° 29' 56.50" E	B_023 N Curve * N (RT) N N N	75° 51′ 48.07" E Data 10,025,709.4351 10,025,708.0144 10,025,709.5229 10,025,659.5286	Dist 8 E E E E	4.0016 3,907,092.5889 3,907,086.9483 3,907,098.4050 3,907,099.1600
Course from PT SWEB_022 to PC SWE Curve SWEB_023 P.I. Station 626*83.21 Delta = 13° 16' 16.85" Degree = 114° 35' 29.61" Tangent = 5.8167 Length = 11.5814 Radius = 50.0000 External = 0.3372 Long Chord = 11.5556 Mid. Ord. = 0.3349 P.C. Station 626*77.39 P.T. Station 626*88.97 C.C. Back = N 75° 51' 48.07" E Ahead = N 89° 08' 04'92" E Chord Bear = N 82° 29' 56.50" E	B_023 N Curve * N (RT) N N N N Curve	75° 51′ 48.07" E Data 10,025,709.4351 10,025,708.0144 10,025,709.5229 10,025,659.5286 Data	Dist 8 E E E E	4.0016 3,907,092.5889 3,907,086.9483 3,907,098.4050 3,907,099.1600
Course from PT SWEB_022 to PC SWE Curve SWEB_023 P.I. Station 626*83.21 Delta = 13* 16' 16.85" Degree = 114* 35' 29.61" Tangent = 5.8167 Length = 11.5814 Radius = 50.0000 External = 0.3372 Long Chord = 11.5556 Mid. Ord. = 0.3349 P.C. Station 626*77.39 P.T. Station 626*88.97 C.C. Back = N 75* 51' 48.07" E Ahead = N 89* 08' 04.92" E Chord Bear = N 82* 29' 56.50" E Curve SWEB_024 P.I. Station 627*29.86 Delta = 2* 14' 34.00" Degree = 2* 44' 33.85" Tangent = 40.8910 Length = 81.7715 Radius = 2,089.0000 External = 0.4002 Long Chord = 81.7663 Mid. Ord. = 0.402	B_023 N Curve * N (RT) N N N Curve * N (LT)	75° 51′ 48.07" E	Dist 8 E E E	4.0016 3,907,092.5889 3,907,086.9483 3,907,098.4050 3,907,099.1600 3,907,139.2913
Course from PT SWEB_022 to PC SWE Curve SWEB_023 P.1. Station 626*83.21 Delta = 13* 16' 16.85" Degree = 114* 35' 29.61" Tangent = 5.8167 Length = 11.5814 Radius = 50.0000 External = 0.3372 Long Chord = 11.5556 Mid. Ord. = 0.3349 P.C. Station 626*77.39 P.C. Station 626*688.97 C.C. Back = N 75* 51' 48.07" E Ahead = N 89* 08' 04'.92" E Chord Bear = N 82* 29' 56.50" E Curve SWEB_024 P.I. Station 627*29.86 Delta = 2* 44' 33.85" Tangent = 40.8910 Length = 81.7715 Radius = 2,089.0000 External = 0.402 Long Chord = 81.7663 Mid. Ord. = 0.4001 P.C. Station 626*88.97 Jongent = 0.4002 Long Chord = 81.7663 Mid. Ord. = 0.4001 P.C. Station 626*88.97 Jongent = 81.7663 Mid. Ord. = 0.4001 P.C. Station 626*88.97 Jong Chord = 81.7663 Mid. Ord. = 0.4001 P.C. Station 626*88.97 Jong Chord = 81.7663 Mid. Ord. = 0.4001 P.C. Station 626*88.97 Jong Chord = 81.7663 Mid. Ord. = 0.4001 P.C. Station 626*70.74	B_023 N Curve * (RT) N N N Curve * N (LT)	75° 51′ 48.07" E Data 10,025,709.4351 10,025,708.0144 10,025,709.5229 10,025,659.5286 Data 10,025,710.1405 10,025,709.5229 10,025,709.5229 10,025,709.5229 10,025,712.3576	Dist 8 E E E E	4.0016 3,907,092.5889 3,907,086.9483 3,907,098.4050 3,907,099.1600 3,907,139.2913 3,907,098.4050 3,907,180.1221
Course from PT SWEB_022 to PC SWE Curve SWEB_023 P.1. Station 626*83.21 Delta = 13° 16' 16.85" Degree = 114° 35' 29.61" Tangent = 5.8167 Length = 11.5814 Radius = 50.0000 External = 0.3372 Long Chord = 11.5566 Mid. Ord. = 0.3349 P.C. Station 626*77.39 P.T. Station 626*88.97 C.C. Back = N 75° 51' 48.07" E Ahead = N 89° 08' 04' 92" E Chord Bear = N 82° 29' 56.50" E Curve SWEB_024 P.I. Station 2° 14' 34.00" Degree = 2° 44' 33.85" Tangent = 40.8910 Length = 81.7715 Radius = 2.089.0000 External = 0.4002 Long Chord = 81.7663 Mid. Ord. = 0.4002 Long Chord = 81.76688.97 C.C. Back = N 89° 08' 04.92" E Cond Bear = N 89° 08' 04.92" E Cond Bear = N 88° 08' 04.92" E Chord Bear = N 88° 00' 47.92" E	B_023 N Curve * (RT) N N N Curve * N (LT)	75° 51′ 48.07" E	Dist 8 E E E E E E E E	4.0016 3,907,092.5889 3,907,086.9483 3,907,098.4050 3,907,099.1600 3,907,139.2913 3,907,098.4050 3,907,180.1221 3,907,066.8574
Course from PT SWEB_022 to PC SWE Curve SWEB_023 P.I. Station 626*83.21 Delta = 13* 16' 16, 85" Degree = 114* 35' 29.61" Tangent = 5.8167 Length = 11.5814 Radius = 50.0000 External = 0.3372 Long Chord = 11.5556 Mid. Ord. = 0.3349 P.C. Station 626*77.39 P.T. Station 626*88.97 C.C. Back = N 75* 51' 48.07" E Ahead = N 89* 08' 04.92" E Chord Bear = N 82* 29' 56.50" E Curve SWEB_024 P.I. Station 627*29.86 Delta = 2* 14' 34.00" Degree = 2* 44' 33.85" Tangent = 40.8910 Length = 81.7715 Radius = 2,089.0000 External = 0.4002 Long Chord = 81.7663 Mid. Ord. = 0.4002 Long Chord = 88* 08' 04.92" E Chord Bear = N 88* 00' 47.92" E Course from PT SWEB_024 to SWEB20	B_023 N Curve * (RT) N N N Curve * (LT) N N N N 02 N 86	75° 51′ 48.07" E Data 10,025,709.4351 10,025,709.4351 10,025,709.5229 10,025,659.5286 Data 10,025,710.1405 10,025,710.1405 10,025,712.3576 10,027,798.2848 53′ 30.92" E Di	E E E E E E E E E E E E E	4.0016 3,907,092.5889 3,907,086.9483 3,907,098.4050 3,907,099.1600 3,907,139.2913 3,907,098.4050 3,907,180.1221 3,907,066.8574 8.6658
Course from PT SWEB_022 to PC SWE Curve SWEB_023 P.1. Station 626*83.21 Delta 13° 16' 16.85" Degree 114° 35' 29.61" Tangent 15.816 Radius 50.0000 External 0.3372 Long Chord 111.556 Mid. Ord. 0.3349 P.C. Station 626*77.39 P.C. Station 626*88.97 C.C. Back 1N 75° 51' 48.07" E Ahead 1N 89° 08' 04' 92" E Chord Bear N 82° 29' 56.50" E Curve SWEB_024 P.1. Station 627*29.86 Delta 20' 14' 34.05" Tangent 20' 14' 34.05" Tangent 20' 44' 33.85" Tangent 20' 44' 33.85" Course from PT SWEB_024 to SWEB20 N 10,025,7	B_023 N Curve * N (RT) N N N Curve * N (LT) N N N N 02 N 86 84.9395	75° 51′ 48.07" E Data 10,025,709.4351 10,025,709.4351 10,025,709.5229 10,025,659.5286 Data Data 10,025,710.1405 10,025,712.3576 10,027,798.2848 53′ 30.92" E Di E 3,908,516.81	Dist 8 E E E st 1,33 88 Sta	4.0016 3,907,092.5889 3,907,092.5889 3,907,098.4050 3,907,099.1600 3,907,139.2913 3,907,098.4050 3,907,180.1221 3,907,066.8574 8.6658 641+09.41

Beginning chain	SWWB_01 descriptio				
		Curve	Data *		
Curve SWWB_01_1 P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chord =	500+39.17 37* 50' 32.40" 50* 08' 22.61" 75.4739 114.2725 6.5273 74.1226	N (LT)	10,026,414.0636	Ε	3,9
Mid. Ord. = P.C. Station P.T. Station C.C. Back = S Ahead = N Chord Bear = N	6.1746 500+00.00 500+75.47 78° 52′ 29.84″ E 63° 16′ 57.75″ E 82° 12′ 13.95″ E		10,026,421.6218 10,026,431.6746 10,026,533.7469	E E E	3, 9 3, 9 3, 9
		Curve *	Data *		
Curve SWWB_01_2 P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chord =	501+30.44 63°46′18.86″ 64°51′06.23″ 54.9623 98.3349 88.3489 15.7010 93.3371	N (RT)	10,026,456.9224	E	3,9
P.C. Station P.T. Station	500+75.47 501+73.81	N N	10,026,431.6746 10,026,424,2868	E E	3, 9 3, 9
C.C. Back = N Ahead = S Chord Bear = S	62° 39′ 14.07" E 53° 34′ 27.06" E 85° 27′ 36.49" E	N	10, 026, 353. 1989	E	3,9
		Curve *	Data *		
Curve SWWB_01_3 P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chord =	502+27.45 33° 13′ 42.14″ 31° 52′ 20.75″ 53.6390 104.2543 179.7660 7.8319 102.7994	N (LT)	10,026,396.5081	Ε	3,9
P.C. Station P.T. Station	501+73.81 502+78.06	N N	10,026,424.2868 10,026,398.4158	E E	3, 9 3, 9
C.C. Back = S Ahead = N Chord Bear = S	58° 48′ 35.21" E 87° 57′ 42.65" E 75° 25′ 26.28" E	N	10,026,578.0680	E	3,9
		Curve *	Data *		
Curve SWWB_01_4 P.I. Station Delta = Degree = Tangent = Length = Radius = External = Long Chord =	503+57.77 45° 56′ 00.23" 30° 27′ 49.70" 79.7055 150.7802 188.0782 16.1921 146.7747	N (RT)	10,026,402.5676	Ε	3, 9
P.C. Station P.T. Station C.C. Back = N Ahead = S Chord Bear = S	87° 00′ 50.97″ E 47° 03′ 08.80″ E 70° 01′ 08.91″ E	N N N	10, 026, 398. 4158 10, 026, 348. 2620 10, 026, 210. 5929	E E E	3, 9 3, 9 3, 9
		Curve	Data		
Curve SWWB_01_5 P.I. Station Delta = Degree = Tangent = Length = Radius = External =	504+60.84 30° 56′ 16.67" 49° 32′ 53.81" 32.0014 62.4400 115.6363 4.3464	N (LT)	10,026,326.4585	E	3,9
Mid. Ord. = Mid. Ord. = P.C. Station P.T. Station C.C. Back = S Ahead = S Chord Bear = S	61.6842 4.1889 504+28.84 504+91.28 47° 03' 08.80" E 77° 59' 25.47" E 62° 31' 17.14" E	N N N N	10,026,348.2620 10,026,319.7998 10,026,432.9051	E E E	3, 9 3, 9 3, 9



#### <u>B SWWB01 CONT.</u>

Course from PT SWWB_01_5 to 40 S 77° 59' 25.47" E Dist 18.1377	
Point 40 N 10,026,316.0258 E 3,904,991.8448 Sta	505+09.42
Course from 40 to 41 S 76° 36′ 10.45" E Dist 82.5962	
Point 41 N 10,026,296.8884 E 3,905,072.1934 Sta	505+92.02
Course from 41 to 42 S 78° 36′ 41.77" E Dist 13.2485	
Point 42 N 10,026,294.2724 E 3,905,085.1810 Sta	506+05.27
Course from 42 to 43 S 77° 51′ 06.25" E Dist 203.5477	
Point 43 N 10,026,251.4373 E 3,905,284.1706 Sta	508+08.81
Course from 43 to 44 S 76° 04′ 17.40" E Dist 8.0000	
Point 44 N 10,026,249.5116 E 3,905,291.9354 Sta	508+16.81
Course from 44 to PC SWWB_01_18 S 77° 59' 25.48" E Dist 111.8257	
Curve Data **	
Curve SWWB_01_18 P.I. Station 509+51.91 N 10,026,221.4005 E Delta = 17° 04′ 46.75″ (LT) Degree = 36° 57′ 54.07″ Tangent = 23.2751 Length = 46.2049 Radius = 155.0000 External = 1.7378 Long Chord = 46.0340 Mid Ord = 1.745	3, 905, 424. 0791
Mid. Or d.     =     1.7185       P. C. Station     509+28.64     N     10,026,226.2435     E       P. T. Station     509+74.84     N     10,026,223.4574     E       C. C.     N     10,026,377.8510     E       Back     =     S 77°     59'     25.47"     E       Ahead     =     N     84°     55'     47.78"     E       Chord Bear     =     S 86°     31'     48.85"     E	3, 905, 401, 3135 3, 905, 447, 2631 3, 905, 433, 5652
Curve Data	
Curve SWWB_01_19	3 005 505 0036
P.1. Station 510+53.78 N 10,026,230.4336 E Delta = 33° 46′ 40.58″ (RT) Degree = 22° 02′ 12.62″ Tangent = 78.9394 Length = 153.2794 Radius = 260.0000 External = 11.7194	3, 905, 525, 8936
Long Chord = 151.0694 Mid. Ord. = 11.2139 P.C. Station 509+74.84 N 10,026,223.4574 E P.T. Station 511+28.12 N 10,026,192.5155 E C.C. N 10,025,964.4747 E Back = N 84° 55′ 47.78″ E Ahead = S 61° 17′ 31.64″ E	3, 905, 447. 2631 3, 905, 595. 1298 3, 905, 470. 2403
Chord Bear = 5 /8° 10' 51,93" E	
Curve SWWB 01 20	
P.I. Station 511+85.39 N 10,026,165.0068 E Delta = 36° 14′ 28.83" (LT) Degree = 32° 44′ 25.60" Tangent = 57.2687 Length = 110.6929 Radius = 175.0000 External = 9.1323 Long Chord = 108.8568	3, 905, 645. 3590
Mid. Ord. = $8.6794$ P.C. Station $511+28.12$ N $10,026,192.5155$ E       P.T. Station $512+38.82$ N $10,026,172.5151$ E       C.C.     N $10,026,346.0046$ E       Back     =     S 61° 17′ 31.64"     E       Ahead     =     N 82° 27′ 59.53"     E       Chord Bear     = $79° 24′ 46.06"$ E	3,905,595.1298 3,905,702.1334 3,905,679.1900
Curve Data	
Curve SWWB_01_21	3 005 750 5000
P.1. Station 512+87.69 N 10,026,178.9153 E Delta = 46° 02′ 58.87" (RT) Degree = 49° 49′ 20.70" Tangent = 48.8735 Length = 92.4276 Radius = 115.0000 External = 9.9545 Long Chord = 89.9600	3,905,750.5860
P.C. Station 512+38.82 N 10,026,172,5151 E P.T. Station 513+31 24 N 10,026,148,4743 5	3,905,702.1334
C.C. N 10,026,146.4143 E Back = N 82° 28' 30.58" E Ahead = S 51° 28' 30.55" E Chord Bear = S 74° 29' 59.99" E	3, 905, 717, 1933

	Curve	Data			
Curve SWWB_01_22 P.I. Station 513+53.16 Delta 26° 30' 54.92" Degree = 61° 36' 30.11" Tangent = 21.9117 Length = 43.0384 Radius = 93.0000 External = 2.5464	N (LT)	10,026,13	34.8265	E	3,9
Wid. Ord.       2.4786         P.C. Station       513+31.24         P.T. Station       513+74.28         C.C.       Back         Back       5 51° 28' 30.55" E         Ahead       5 77° 59' 25.47" E	N N N	10,026,14 10,026,13 10,026,22	48.4743 30.2673 21.2318	E E E	3,9 3,9 3,9
Chord Bear = $5 - 64^{\circ} + 43' - 58_{\circ} 01'' = E$	WR 01 2	95 S 77° F	59' 25 5	7" C	Dict 0
	Curve	Data	59 25.51		5151 5
Curve SWWB_01_25	*	*			
P.I. Station 514+82.10 Delta 18' 12' 37.24" Degree = 52° 05' 13.46" Tangent = 17.6293 Radius = 110.0000 External = 1.4037 Long Chord = 34.8144	N (LT)	10,026,10	07.8325	E	3,9
Mid. Ord. = 1.3861 P.C. Station 514+64.47 P.T. Station 514+99.43 C.C. = S 77° 59' 25.47" E Ahead = N 83° 47' 57.29" E Chord Bear = S 87° 05' 44.09" E	N N N	10,026,11 10,026,10 10,026,21	1.5008 09.7367 19.0932	E E E	3,9 3,9 3,9
Course from PT SWWB_01_25 to PC SW	WB_01_2	28 N 83° 4	47′ 57.29	9" E	Dist 3
	Curve	Data			
Curve SWWB_01_28 P.I. Station 515+52.20 Delta = 18° 12' 37.24" Degree = 57° 17' 44.81" Tangent = 16.0267 Length = 31.7830 Radius = 100.0000 External = 1.2761 Long Chord = 31.6494	N (RT)	10,026,11	15.4364	E	3,9
Mid. Ord.     =     1.2600       P.C. Station     515+36.18       P.T. Station     515+67.96       C.C.     Back     =       Back     =     N 83° 47' 57.29" E       Ahead     =     S 77° 59' 25.47" E       Chord Bear     =     S 87° 05' 44.09" E	N N N	10,026,11 10,026,11 10,026,01	13.7054 12.1017 14.2904	E E E	3,9 3,9 3,9
Course from PT SWWB_01_28 to PC SW	WB_01_3 Curve	51 S 77° 5 Data	59′25.48	3" E	Dist 7
Curve SWWB_01_31 P.I. Station 517+75.74 Delta 7° 09' 12.89" Degree = 2° 44' 33.85" Tangent = 130.5792 Length = 260.8190 Radius = 2,089.0000 External = 4.0771 Long Chord = 260.6496	N (RT)	10,026,06	58.8680	E	3,9
Mid. 0rd. = 4.0692 P.C. Station 516+45.16 P.T. Station 519+05.98 C.C. Back = S 77° 59' 25.47" E Ahead = S 70° 50' 12.59" E Chord Bear = S 74° 24' 49.03" E	N N N	10,026,09 10,026,02 10,024,05	96.0383 26.0042 52.7607	E E E	3,9 3,9 3,9
Course from PT SWWB_01_31 to PC SW	WB_01_3	34 S 70° 5	50' 12.58	З" E	Dist 1
	Curve	Data			
Curve SWWB_01_34       P.I. Station     520+52.63       Delta     =     2° 47′ 47.46"       Degree     =     2° 59′ 53.55"       Tangent     =     46.6457       Length     =     93.2729       Radius     =     1,911.0000       External     =     0.5692       Long Chord     =     93.2636       Mid. Ord.     =     0.5690	N (LT)	10,025,97	77.8660	E	3,9
P.C.       Station       520+05.98         P.T.       Station       520+99.25         C.C.       Back       = S 70° 50′ 12.59" E         Ahead       = S 73° 38′ 00.04" E         Chord Bear       = S 72° 14′ 06.32" E	N N N	10,025,99 10,025,96 10,027,79	93.1779 54.7220 98.2847	E E	3,9 3,9 3,9

Course from PT SWWB\_01\_34 to PC SWWB\_01\_37 S 58° 53' 56.09" E Dist 7.8050



### <u>& SWWB01 CONT.</u>

	Curve	Data *		
Curve SWWB_01_37 P.I. Station 522+61.39 Delta = 9° 13′ 29.42" Degree = 2° 59′ 42.27" Tangent = 154.3337 Length = 308.0003 Radius = 1,913.0000	N (LT)	10,025,917.7864	E	3, 906, 683. 3031
Long Chord =     307.6677       Mid. Ord. =     6.1953       P.C. Station     521+07.06       P.T. Station     524+15.06       C.C.     Back =     S       Ahead =     S     83°     05'     03.34"       Chord Bear =     S     73°     28'     18.63"	N N N	10,025,960.6904 10,025,899.2031 10,027,798.2847	E E E	3,906,535.0529 3,906,836.5139 3,907,066.8574
	Curve	Data		
Curve SWWB_01_38 P.I. Station 524+30.01 Delta = 33° 56′ 51.72″ Degree = 116° 55′ 48.57″ Tangent = 14.9564 Length = 20.0325	N (LT)	10,025,897.4022	E	3,906,851.3615
Radius     =     23.022       Radius     =     49.0000       External     =     2.2318       Long Chord     =     2.1345       P.C. Station     524+15.06       P.T. Station     524+44.09	N N	10,025,899.2031 10,025,904.1997 10,025,947.8466	E	3,906,836.5139 3,906,864.6839 3,906,842,4140
Back = S 83° 05′ 03.34" E Ahead = N 62° 58′ 04.94" E Chord Bear = N 79° 56′ 30.80" E	,	10,023,341,0400	L	5, 500, 042. 4140
Course from PT SWWB_01_38 to PC SW	WB_01_4	41 N 55° 53′ 35.0	3" E D1	st 6.3702
	Curve *	Data *		
Curve Swmbol_01_41       524+57.50         Pelta       =       17° 02′ 06.96″         Degree       =       121° 54′ 21.29″         Tangent       =       7.0390         Length       =       13.9741         Radius       =       47.0000         External       =       0.5242	N (LT)	10,025,911.5222	Ε	3,906,875.9150
Long Chord = 13.9227 Mid. Ord. = 0.5184 P.C. Station 524+50.46 P.T. Station 524+64.44 C.C. Back = N 57° 48' 16.43" E Anead = N 40° 46' 09.47" E Chord Bear = N 49° 17' 12.95" E	N N N	10,025,907.7717 10,025,916.8531 10,025,947.5448	E E E	3,906,869.9584 3,906,880.5116 3,906,844.9164
Course from PT SWWB_01_41 to PC SW	WB_01_4	44 N 37° 08′ 05.5	2" E Di	st 5.9587
	Curve	Data *		
Curve SWWB_01_44 P.I. Station 524+78.39 Delta 19° 18′ 43.50″ Degree = 121° 54′ 21.29″ Tangent = 7.9967 Length = 15.8418 Radius = 47.0000	N (LT)	10,025,928.2718	E	3, 906, 888. 5225
External       =       0.6754         Long Chord       =       15.7669         Mid. Ord.       =       0.6659         P.C. Station       524+70.39         P.T. Station       524+86.24         C.C.       =       N.33°.30′.01.60″.F	N N N	10,025,921.6035 10,025,936.0246 10,025,947.5448	E E E	3, 906, 884. 1088 3, 906, 890. 4826 3, 906, 844. 9164
Ahead = N 14° 11' 18.10" E Chord Bear = N 23° 50' 39.85" E				
Course from PT SWWB_01_44 to 45 N	14° 11	′ 18.10" E Dist 7	1.0310	
Point 45 N 10,026,00	4.8889	E 3,906,907.89	31 Sta	525+57.27
Ending chain SWWB_01 description				



#### <u>B</u> SWWB02

Beginning chain SWWB_02 description		
Point SWWB2001 N 10,025,907.2972 E 3,906,976.9336 Sta 525+00.00		
Course from SWWB2001 to PC SWWB_021 S 85° 49′ 07.02" E Dist 28.3950		
Curve Data **		
Curve SWWB_021 P.I. Station 525+31.90 N 10,025,904.9712 E 3,907,008.748 Delta = 10° 00′ 56.58" (RT) Degree = 143° 14′ 22.02" Tangent = 3.5051 Length = 6.9923 Radius = 40,0000 External = 0.1533	7	
Long Chord = 6.9834 Mid. Ord. = 0.1527 P.C. Station 525+28.39 N 10,025,905.2268 E 3,907,005.253 P.T. Station 525+35.39 N 10,025,904.1115 E 3,907,012.146 C.C. N 10,025,865.3332 E 3,907,002.336 Back = S 85° 49' 07.02" E Ahead = S 75° 48' 10.44" E Chord Bear = S 80° 48' 38.73" E	0 8 4	
Course from PT SWWB_021 to PC SWWB_022 S 75° 48′ 10.44" E Dist 62.0390		
"Curve Data		
Curve SWWB_022 P.I. Station 526+03.89 N 10,025,887.3096 E 3,907,078.561 Delta = 14° 44′ 30.98" (LT) Degree = 114° 35′ 29.61" Tangent = 6.4681 Length = 12.8648	5	
Radius     =     50,0000       External     =     0.4166       Long Chord     =     0.4132       P.C. Station     525+97.43     N     10,025,888.8960     E     3,907,072.290       P.T. Station     526+10.29     N     10,025,887.3711     E     3,907,085.029       C.C.     N     10,025,937.3689     E     3,907,084.553       Back     =     S 48' 10.44"     E       Ahead     =     N     89' 27' 18.58"     E       Chord Bear     =     S 83'' 10' 25.93"     E	9 3 8	
Curve Data **		
Curve SWWB_023 P.I. Station 526+53.04 N 10,025,887.7777 E 3,907,127.780 Delta = 2* 33′ 47.66" (LT) Degree = 2* 59′ 53.55" Tangent = 42.7533 Length = 85.4923 Radius = 1,911.0000 External = 0.4782	6	
Long Chord = 85.4852 Mid. Ord. = 0.4781 P.C. Station 526+10.29 N 10,025,887.3711 E 3,907,085.029 P.T. Station 526+95.78 N 10,025,890.0957 E 3,907,170.471 C.C. N 10,027,798.2847 E 3,907,066.857 Back = N 89° 27′ 18.58" F	3 0 4	
Ahead = N 86° 53′ 30.92″ E Chord Bear = N 88° 10′ 24.75″ E		
Course from PT SWWB_023 to PC SWWB_024 N 86° 53′ 30.92" E Dist 1,139.4216		
Curve Data		
Curve SWWB_024       **         P.I. Station       538+48.43 N       10,025,952.5917 E       3,908,321.421         Delta       =       20° 00′ 00.00″ (RT)       20° 20° 20° 20° 20°       20° 20° 20° 20° 20° 20°         Degree       =       76° 23′ 39.74″       3.2245       245       26° 1799         Radius       =       75.0000       75.0000       20° 20° 20°       20° 20° 20°	6	
External     =     1.1570       Long Chord     =     26.0472       Mid. Ord.     =     1.1394       P.C. Station     538+35.20     N     10,025,951.8747     E     3,908,308.216       P.T. Station     538+61.38     N     10,025,948.7491     E     3,908,334.075       C.C.     N     10,025,876.9850     E     3,908,312.283       Back     =     N     86°     53′ 30.92"     E       Ahead     =     S     73°     06′ 29.08"     E       Chord Bear     =     S     83°     06′ 29.08"     E	6 6 0	

	Curve Data
Curve SWWB_025 P.I. Station 539+35.87 Delta = 20° 00' 00.00" Degree = 67° 24' 24.48" Tangent = 14.9878 Length = 29.6706 Pardius = 85.0000	N 10,025,927.1049 E 3,90 (LT)
Ratids -     31.0000       External =     1.3113       Long Chord =     29.5202       Mid. Ord. =     1.2913       P.C. Station     539+20.89       P.T. Station     539+50.56	N 10,025,931.4598 E 3,90 N 10,025,927.9175 E 3,90 N 10,025,012,705 E 3,90
Back = S 73° 06′ 29.08" E Ahead = N 86° 53′ 30.92" E Chord Bear = S 83° 06′ 29.08" E	N 10,020,012,1323 L 3,30
Course from PT SWWB_025 to SWWB200	02 N 86° 53′ 30.92" E Dist 88.6075
Point SWWB2002 N 10,025,93	32.7218 E 3,908,508.7943 Sta 5
Ending chain SWWB_02 description	

Course from PT SWWB\_024 to PC SWWB\_025 S 73° 06' 29.07" E Dist 59.5018

,908,405.3513

,908,391.0102 ,908,420.3171 ,908,415.7084

540+39.16 .....





CHECKED:

### <u>B</u> OFFSITE DRAINAGE

## Beginning chain P\_STM description

Point STM1	Ν	10,025,880.9443 E 3,906,334.7036 Sta 500+00.00
Course from STM1 to S	TM2	S 69° 13′ 30.23" E Dist 254.7110
Point STM2	Ν	10,025,790.5989 E 3,906,572.8535 Sta 502+54.71
Course from STM2 to S	тмз	S 78° 41′ 07.07" E Dist 207.7042
Point STM3	Ν	10,025,749.8477 E 3,906,776.5209 Sta 504+62.42
Course from STM3 to S	TM4	N 11° 46′ 19.42" E Dist 111.3074
Point STM4	Ν	10,025,858.8140 E 3,906,799.2296 Sta 505+73.72
Course from STM4 to S	TM5	N 14° 16′ 10.66" E Dist 288.6801
Point STM5	Ν	10,026,138.5874 E 3,906,870.3851 Sta 508+62.40
Course from STM5 to S	TM6	N 70° 16′ 33.34" E Dist 74.7549
Point STM6	Ν	10,026,163.8164 E 3,906,940.7540 Sta 509+37.16
Course from STM6 to S	TM7	N 58° 38′ 57.60" E Dist 150.7964
Point STM7	Ν	10,026,242.2720 E 3,907,069.5339 Sta 510+87.95
Course from STM7 to S	SMT8	N 61° 40′ 22.30" E Dist 606.6313
Point STM8	Ν	10,026,530.1217 E 3,907,603.5228 Sta 516+94.59
Course from STM8 to S	тм9	N 85° 53′ 40.42" E Dist 93.3310
Point STM9	Ν	10,026,536.8034 E 3,907,696.6143 Sta 517+87.92
Course from STM9 to S	TM1	D N 63° 45′ 46.11" E Dist 99.5397
Point STM10	Ν	10,026,580.8087 E 3,907,785.8986 Sta 518+87.46
Ending chain P_STM de	scr	iption

## <u>B DRAINAGE BYPASS</u>

Beginning chain STM\_BYPASS description Point STMBYPASS3 N 10,025,869.8160 E 3,907,084.1670 Sta 100+00.00 Course from STMBYPASS3 to STMBYPASS4 N 14° 09' 36.53" E Dist 454.0093 Point STMBYPASS4 N 10,026,310.0305 E 3,907,195.2326 Sta 104+54.01 Ending chain STM\_BYPASS description

### **B** KINGS MILL PARK

Beginning chain KMP description							
Point KMP1	N	10,025,71	9.8616	E 3,908,866.7	'117 Sta	100+00.00	
Course from KMP1	to KMP2	N 3° 09′	51.97"	W Dist 172.9533	i		
Point KMP2	Ν	10,025,89	2.5511	E 3,908,857.1	644 Sta	101+72.95	
Ending chain KMP description							

## <u>B</u> SWEB\_03

Beginning chain SWEB_03 description						
Point SWEB001	X 3,908,516.8188	Y 10,025,784.9395 Sta	641+09.41			
Course from SWEB001	to PC SWEB_031 N 86°	53' 30.92" E Dist 104.	3967			
	Curve *	Data				
Curve SWEB_031 P.I. Station Delta = Degree = Tangent = Length = Radius =	642+27.03 X 20°00'00.00"(LT) 76°23'39.74"(LT) 26.1799 75.0000	3,908,634.2670 Y	10,025,791.3168			
External = Long Chord = Mid. Ord. = P.C. Station P.T. Station C.C. = N 86 Ahead = N 86 Chord Bear = N 76	1.1570 26.0472 1.1394 642+13.81 X 642+39.99 X 642*39.99 X 53' 30.92" E 53' 30.92" E	3,908,621.0619 Y 3,908,646.4304 Y 3,908,616.9954 Y	10,025,790.5998 10,025,796.5070 10,025,865.4895			
Course from PT SWEB	_031 to PC SWEB_032 N	66° 53′ 30.92" E Dist	56.5780			

### <u>B</u> SWEB\_03 CONT.

	Curve	Data	
Curve SWEB_032 P.1. Station 643+11.55 Delta = 20° 00' 00.00" Degree = 67° 24' 24.48" Tangent = 14.9878 Length = 29.6706 Radius = 85.0000 Systemed = 13113	(RT)	3,908,712.2543	Y 10,025,8
Long       Chord       -       1.313         Mid.       Ord.       =       1.2913         P.C.       Station       642+96.56         P.T.       Station       643+26.24         C.C.       Station       643.22         Back       =       N       66*       53'       30.92"       E         Ahead       =       N       86*       53'       30.92"       E	X X X	3,908,698.4690 3,908,727.2200 3,908,731.8287	Y 10,025,8 Y 10,025,8 Y 10,025,7
Chord Bear = N 76° 53′ 30.92" E	N 064	E7/ 70 02" E Die	+ 120 7170
Point SWEB002 X 3 909 94	17 3600	53 30.92 E DIS	T 120. 3179
Course from SWEB002 to SWEB003 N 6	5 17	32 97" E Dic+ 19	0158
Point SWEB003 X 3,908,86	54.6359	Y 10.025.839.87	88 Sta 644+
Course from SWEB003 to SWEB004 N 8	36° 53′	30.92" E Dist 60	.5015
Point SWEB004 X 3.908.92	25,0484	Y 10.025.843.15	91 Sta 645+3
Course from SWEB004 to SWEB005 N 6	5° 05'	25.85" E Dist 10	,7703
Point SWEB005 X 3,908,93	34.8168	Y 10,025,847.69	54 Sta 645+3
Course from SWEB005 to SWEB006 N 8	86° 53′	30.92" E Dist 2,	023.4832
Point SWEB006 X 3,910,95	5.3235	Y 10,025,957.40	78 Sta 665+0
Course from SWEB006 to SWEB007 N 8	32° 11′	43.84" E Dist 24	. 4271
Point SWEB007 X 3,910,97	9.5243	Y 10,025,960.72	49 Sta 665+8
Course from SWEB007 to PC SWEB_033	5 N 86°	53' 30.92" E Dis	† 28.2833
	Curve	Data	
Curve SWEB_033	*	3.911.032.9689	Y 10,025,90
Deita   =   13°   41°   07.97"     Degree   =   27°   14'   25.68"     Tangent   =   25.2400     Length   =   50.2398     Radius   =   210.3333     External   =   1.5090     Long Chord   =   50.1204	(ŔT)	5,511,0521,5005	
P.C. Station 666+13.03	Х,	3,911,007.7660	Y 10,025,9
$P_{1}$ STUTION 666+63.27 C.C. = N 86° 53′ 30 92" F	Ŷ	3,911,019,1702	Y 10,025,7
Ahead = 5 79° 25′ 21.11" E Chord Bear = 5 86° 15′ 55.09" E			
	Curve	Data	
Curve SWEB_034	*	*	
P.I. Station 666-88.75 Delta 13*41'07.97" Degree = 26*59'01.98" Tangent = 25.4800 Length = 50.7175 Radius = 212.3333 External = 1.5233 Long Chord = 50.5970	X (LT)	3,911,082.8270	Y 10,025,9
P.C. Station 666+63.27 P.T. Station 667+13.99	X	3,911,057,7800 3,911,108,2696	Y 10,025,9
$C_{1}C_{2}$ Back = S 79° 25′ 21.11" E	X	3, 911, 096, 7569	Ý 10,026,10
Ahéad = N 86° 53′ 30.92" E Chord Bear = S 86° 15′ 55.09" E			
Course from PT SWEB_034 to SWEB008	8 N 86°	53' 30.92" E Dis	+ 187.8474
Point SWEB008 X 3,911,29	95.8406	Y 10,025,965.88	30 Sta 669+0
Course from SWEB008 to SWEB009 S 8	85° 21′	02.64" E Dist 22	. 2259
Point SWEB009 X 3,911,31	7.9933	Y 10,025,964.08	15 Sta 669+3
Course from SWEB009 to SWEB010 N 8	86° 53′	30.92" E Dist 54	. 5990
Point SWEB010 X 3,911,37	2.5120	Y 10,025,967.04	18 Sta 669+
Course from SWEB010 to SWEB011 N 8	37° 02'	42.11" E Dist 10	.0000
Point SWEB011 X 3,911,38	32.4987	Y 10,025,967.55	73 Sta 669+8
Course from SWEB011 to SWEB012 N 5	6° 12'	40.97" E Dist 25	.1137
Point SWEB012 X 3,911,40	3.3706	Y 10,025,981.52	38 Sta 670+
Course from SWEB012 to SWEB013 N 8	87° 05′	54.50" E Dist 55	6.8585
Point SWEB013 X 3,911,95	59.5151	Y 10,026,009.71	17 Sta 675+
Ending chain SWEB_03 description			



S

# <u>B</u> SWWB\_03

Beginning chain SWWB_03 description						
Point SWWB2019	3,908,508.7943 Y	10,025,932.7218 Sta	540+39.16			
Course from SWWB2019 to	SWWB2020 N 86° 53'	30.92" E Dist 74.9287				
Point SWWB2020	3,908,583.6128 Y	10,025,936.7844 Sta	541+14.09			
Course from SWWB2020 to	SWWB2021 N 86° 38'	02.22" E Dist 116.0028				
Point SWWB2021	3,908,699.4154 Y	10,025,943.5954 Sta	542+30.09			
Course from SWWB2021 to	SWWB2022 N 88° 11'	33.60" E Dist 125.6181				
Point SWWB2022	3,908,824.9711 Y	10,025,947.5573 Sta	543+55.71			
Course from SWWB2022 to	SWWB2023 N 86° 24'	50.48" E Dist 124.0298				
Point SWWB2023	3,908,948.7580 Y	10,025,955.3149 Sta	544+79.74			
Course from SWWB2023 to	SWWB2024 N 86° 14'	29.59" E Dist 30.9483				
Point SWWB2024	3,908,979.6398 Y	10,025,957.3436 Sta	545+10.69			
Course from SWWB2024 to	SWWB2025 N 86° 15'	03.02" E Dist 120.7277				
Point SWWB2025	3,909,100.1091 Y	10,025,965.2378 Sta	546+31.42			
Course from SWWB2025 to	SWWB2026 N 87° 32'	00.14" E Dist 36.3851				
Point SWWB2026	3,909,136.4605 Y	10,025,966.8037 Sta	546+67.80			
Course from SWWB2026 to	SWWB2027 N 86° 53'	30.92" E Dist 1,033.9308				
Point SWWB2027	3,910,168.8704 Y	10,026,022.8630 Sta	557+01.73			
Course from SWWB2027 to	SWWB2028 N 87° 22'	52.91" E Dist 1,110.1410				
Point SWWB2028	3,911,277.8522 Y	10,026,073.5830 Sta	568+11.87			
Course from SWWB2028 to	SWWB2029 S 84° 44′	22.85" E Dist 17.2937				
Point SWWB2029	3,911,295.0731 Y	10,026,071.9975 Sta	568+29.17			
Course from SWWB2029 to	SWWB2030 N 86° 53'	30.92" E Dist 44.4692				
Point SWWB2030	3,911,339.4768 Y	10,026,074.4086 Sta	568+73.64			
Course from SWWB2030 to	SWWB2031 N 87° 05'	54.45" E Dist 29.4499				
Point SWWB2031	3,911,368.8890 Y	10,026,075.8993 Sta	569+03.09			
Course from SWWB2031 to	SWWB2032 N 78° 17'	05.75" E Dist 26.1061				
Point SWWB2032	3,911,394.4514 Y	10,026,081.2001 Sta	569+29.19			
Course from SWWB2032 to	SWWB2033 S 77° 00'	42.98" E Dist 7.3049				
Point SWWB2033	3,911,401.5694 Y	10,026,079.5583 Sta	569+36.50			
Course from SWWB2033 to	SWWB2034 N 87° 05'	54.50" E Dist 553.6949				
Point SWWB2034	3,911,954.5544 Y	10,026,107.5861 Sta	574+90.19			
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NOTES:

1. ALL 500-YEAR WATER SURFACE ELEVATIONS(WSEL) SHOWN IN THIS PLAN SET ARE PROJECTED FROM BEN'S BRANCH BASED ON THE FEMA EFFECTIVE FIRM PANELS AND FLOOD PROFILES FOR BEN'S BRANCH IN MONTGOMERY COUNTY.



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1. ALL EXISTING SIGNS, SAFETY AND TREATMENTS, BILBOARDS, MAIL BOXES, AND OTHER REQUIRED REMOVALS WITHIN THE ROW, NOT INCLUDED IN THE SUMMARY ARE TO BE CONSIDERED INCIDENTAL TO TXDOT ITEM 100.



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NOTES:

1. ALL 500-YEAR WATER SURFACE ELEVATIONS(WSEL) SHOWN IN THIS PLAN SET ARE PROJECTED FROM BEN'S BRANCH BASED ON THE FEMA EFFECTIVE FIRM PANELS AND FLOOD PROFILES FOR BEN'S BRANCH IN MONTGOMERY COUNTY.

- 2. FOR ALIGNMENT INFORMATION SEE HORIZONTAL ALIGNMENT DATA SHEET. 4. FOR CONTRACTOR INFORMATION ONLY, REFER TO LANDSCAPING SHEETS SIDEWALK ALIGNMENT IS ALONG INSIDE EDGE OF SIDEWALK.
- 3. ALL DIMENSIONS ARE TO FACE OF CURB UNLESS NOTED OTHERWISE.
- FOR MORE INFORMATION.
- 5. ALL CONTROL POINT STATIONS AND OFFSETS REFERENCE NORTHPARK BASEL INE.

LEGEND PROP ROADWAY PROP BRIDGE TEMP PAVEMENT PROP SIDE PATH (A)12" REINF CONCRETE PAVMENT B 1" ASPHALT STAB BASE(GR 4)(PG 64) © 6" CEMENT TREATED BASE D 8" LIME TREATED BASE E 5" REINF CONCRETE SIDE PATH F 12" MONO CURB (R) MBGF  $\bigcirc$ BLOCK SODDING S SINGLE GUARDRAI MBGF TRANSITION (MBGF-TR) Э MOW STRIP 42" BARRIER U CURB RAMP (TY 20  $\bigcirc$ 36" RAIL (TY SSTR) CONCRETE CONCRETE ĸ L CURB RAMP (TY 7) V 6" CEMENT TREATED SUBGRADE M MSE RETAINING WALL - PROPOSED TRAVEL LANE N U-TURN CURB  $\odot$ WIDE FLANGE PAVEMENT TERMINAL P CRASH CUSHION ATTENUATOR 5 LOOSE AGGR FOR GROUNDCOVER (TY 1) 0 TYPICAL SECTION LABEL - PROP ROW  $(\mathbf{x})$ DRIVEWAY ID \_\_\_\_ EXIST/UPRR  $\bigcirc$ -XXX CURVE - CONSTRUCTION H oject CONTROL POINT X CHL MAT X KATE LIGHT 134443 4 CENSED SSI ONAL ENG Anste DATE: 4/5/2021 50 SCALE : 1 = 100' -H 1 = 10' -V BY DATE **REVISIO** HNTB The HNTB Companies Infrastructure Solutions Firm Registration Numb LAKE HOUSTON REDEVELOPMENT AUTHORITY & TIRZ 10 c/o HUNTON ANDREWS KURTH LLP 600 TRAVIS, SUITE 4200 HOUSTON, TX 77007 벖 CITY OF HOUSTON HOUSTON PUBLIC WORKS NORTHPARK DRIVE PLAN NORTHPARK DRIVE STA 23+25 TO STA 33+25 SHEET 3 OF 10 TED. RD. STATE CITY OF HOUSTON WBS HIGHWAY NO DESIGNED: CS 6 TEXAS SEE TITLE SHEET CHECKED: STATE DISTRICT COUNTY CONTROL SECTION JOB SHEET NO HOU WONTGOMERY 0912 37 232 222 RAWN: CHECKED 4/5/2021 1:10:06 PM





















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N	PROP ROADWAY PROP BRIDGE
	(A) 12" REINF CONCRETE PAVMENT
	(B) 1" ASPHALT STAB BASE (GR 4) (PG 64)
	C 6" CEMENT TREATED BASE
	(D) 8" LIME TREATED BASE
$\mathcal{C}'$	E 5" REINF CONCRETE SIDE PATH
	(F) 12" MONO CURB (R) MBGF
	WOW STRIP (T) MBGF TRANSITION
	(1) MOW STRIF (1) (MBGF-TR) (1) 42" BARRIER (1) CURB RAMP (TY 2018)
	(ISSCB) (SSCB) (INTERIGATION )
	(K) CONCRETE SLEEVE (SEE NOTE 4)
	CURB RAMP (V) 6" CEMENT
	(M) MSE RETAINING WALL  PROPOSED
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	1.		A 12" REINF CONCRETE PAVMENT
	'Τ		B 1" ASPHALT STAB BASE (GR 4) (PG 64)
			C 6" CEMENT TREATED BASE
			D 8" LIME TREATED BASE
			(E) 5" REINF CONCRETE SIDE PATH
	(r		E 12" MONO CURB R MBGE
			BLOCK SODDING STERMINAL (SGT)
			(H) MOW STRIP (T) (MBGF-TR)
			(I) (SSCB) (U) CURB RAMP (TY 20)
			J 36" RAIL (TY SSTR) IRRIGATION
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			CURB RAMP V 6" CEMENT (TY 7) TREATED SUBGRADE
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PLAN



DRIVEWAY	CONTROLL ING	STATION AT CL		RADIUS	WIDTH	LENGTH	FACE OF CURB	3 TO SIDEWALK	SIDE	WALK	SIDEWAL	K TO ROW	CONC	CSTR
NUMBER	PGL	OF DRIVEWAY	LIZRI	(FT)	(FT)	(FT)	SLOPE (%)	L1(FT)	SLOPE (%)	L2(FT)	SLOPE (%)	L3(FT)	(SY)	ESMNT(FT)
1	NORTHPARK	17+01.90	LT	25	28.00	59.75	5.00%	12.23	2.00%	10.00	5.28%	37.22	215.61	
2	NORTHPARK	17+03.87	RT	25	32.00	40.09	6.00%	6.78	2.00%	10.00	7.00%	23.31	172.41	
3	NORTHPARK	19+00.42	RT	25	34.00	35.44	6.00%	18.44	2.00%	10.00	6.00%	7.00	141.67	6
4	WBFR	204+23.79	LT	25	30.00	26.72	0.50%	15.72	0.10%	10.00	0.50%	1.00	117.46	
5	WBFR	205+37.83	LT	20/14	26.50	20.09	4.00%	6.51	1.00%	10.00	6.00%	3.58	71.01	
6	EBFR	305+95.36	RT	20/15	26.50	21.00	-6.00%	10.00	0.50%	10.00	0.50%	1.00	71.01	
7	WBFR	206+77.64	LT	13	30.00	37.00	2.00%	3.00	1.00%	10.00	5.00%	24.00	132.07	23
8	EBFR	307+85.92	RT	15/14	29.50	22.00	4.00%	3.00	2.00%	10.00	7.50%	9.00	62.72	6
9	WBFR	208+58.58	LT	13	30.50	19.00	1.00%	1.00	1.00%	10.00	1.00%	8.00	72.87	5
10	EBFR	308+85.17	RT	14	32.00	20.25	4.00%	3.25	2.00%	10.00	6.00%	7.00	82.47	6
11	WBFR	209+42.59	LT	13	34.00	14.00	-0.30%	1.00	-0.30%	10.00	-0.30%	3.00	61.21	
12	WBFR	213+87.45	LT	15/10	24.00	19.00	-4.00%	3.00	1.00%	10.00	0.50%	6.00	57.82	5
13	WBFR	218+23.01	LT	14	31.00	28.92	2.00%	2,92	2.00%	10.00	5.00%	16.00	108.71	15
14	WBFR	221+02.23	LT	14	30.00	17.06	4.00%	6.06	2.00%	10.00	2.00%	1.00	73.35	
15	NORTHPARK	41+71.66	RT	25	35.00	35.75	6.00%	24.75	2.00%	10.00	2.00%	1.00	168.95	
16	NORTHPARK	41+73.93	LT	25	24.00	38.00	5.50%	27.00	2.00%	10.00	2.00%	1.00	155.62	
17	NORTHPARK	43+36.86	LT	15	30.00	20.75	6.00%	9.75	2.00%	10.00	2.00%	1.00	83.69	
48	LOOP 494	400+06.79	LT	20	30.00	27.63	1.00%	27.63					106.19	5
49	LOOP 494	403+85.10	LT	10	34.00	26.43	4.75%	26.43					104.61	15
50	LOOP 494	408+53.79	LT	10	35.00	26.55	6.00%	26.55					107.86	15
51	LOOP 494	410+27.27	LT	10	29.00	22.41	4.50%	22.41					76.99	10
52	LOOP 494	412+97.29	LT	20	29.00	23.03	-2.75%	12.03			1.00%	11	88.97	
53	LOOP 494	402+00.27	LT	15	30.00	17.36	1.00%	17.36					68.65	





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NOTES: 1. CONSTRUCTION EASEMENTS ON SELECT DRIVEWAYS. SEE DRIVEWAY SUMMARY TABLE FOR APPLICABLE DRIVEWAYS.

DRIVEWAY	CONTROLLING	STATION AT CL		ANGLE	RADIUS	RADIUS	WIDTH	LENGTH	FACE OF CURB	TO SIDEWALK	SIDE	NALK	SIDEWAL	K TO ROW	CONC	EASEMENT
NUMBER	PGL	OF DRIVEWAY	LI/KI	(DEG)	R1 (FT)	R2 (FT)	(FT)	(FT)	SLOPE (%)	L1 (FT)	SLOPE (%)	L <mark>2 (</mark> FT)	SLOPE (%)	L3 (FT)	(SY)	(FT)
18	NORTHPARK	44+58.66	LT	90	20	20	30	24.3	7.62%	13.00	1.50%	10	7.75%	1.29	104	
19	NORTHPARK	46+88.91	LT	90	12.5	20	32	22.3	7.97%	11.29	1.50%	10	10.00%	1	125	8
20	NORTHPARK	47+48.82	LT	90	20	12.5	33	21.9	7.95%	10.94	1.50%	10	6.86%	1	120	6
21	NORTHPARK	48+56.09	LT	90	20	20	27.5	22.9	6.50%	11.84	1.50%	10	4.76%	1.05	93	
22	NORTHPARK	50+10.33	LT	90	20	20	34	24.2	1.29%	13.20	1.50%	10	2.06%	0.97	114	
23	NORTHPARK	51 <b>+</b> 43.20	LT	90	20	20	26.5	24.2	3.15%	13	1.50%	10	4.20%	1.19	94	
24	NORTHPARK	53+23.74	LT	90	20	20	29	24.2	5.85%	13	1.50%	10	5.93%	1.18	101	
25	NORTHPARK	54+88.61	LT	90	15	20	35	24.2	5.46%	13	1.50%	10	4.24%	1.18	113	
26	NORTHPARK	55+30.36	RT	90	15	15	28.6	15.2	2.00%	3	1.50%	10	2.91%	2.21	78	5
27	NORTHPARK	55+49.28	LT	90	15	15	24	24.2	6.08%	13	1.50%	10	5.98%	1.17	79	
28	NORTHPARK	56+62.25	LT	90	10	10	32	24.2	2.54%	13	1.50%	10	1.71%	1.17	94	
29	NORTHPARK	57+09.46	LT	73.5	20	10	25	25.2	2.09%	13.56	1.50%	10.43	2.48%	1.21	90	
30	NORTHPARK	59 <b>+</b> 31.64	LT	90	12	20	24	24.2	6.00%	13	1.50%	10	6.17%	1.16	<b>9</b> 5	5
31	NORTHPARK	59+85.20	LT	90	20	12	34	24.2	6.69%	13	1.50%	10	6.67%	1.15	127	5
32	NORTHPARK	61+36.04	LT	90	20	20	35	23.7	7.44%	12.37	1.50%	10	7.46%	1.34	115	
33	NORTHPARK	63+99.74	RT	90	14	14	24	14.4	2.33%	3	1.50%	10	1.57%	1.36	64	5
34	NORTHPARK	64+22.87	LT	90	20	20	35	22	7.96%	9.92	1.50%	10	7.81%	2.06	152	11
35	NORTHPARK	65+15.69	LT	90	15	20	25	21.4	7.89%	9.13	1.50%	10	6.98%	2.3	87	3
36	NORTHPARK	65+78.88	LT	90	20	15	28	22.6	5.82%	8.59	1.50%	10	1.00%	4.01	<mark>8</mark> 9	
37	NORTHPARK	67+20.74	LT	90	15	15	24	21.4	7.99%	7.38	1.50%	10	6.27%	4.06	77	2
38	NORTHPARK	67+88.21	LT	90	20	20	26	20.5	6.03%	6.8	1.50%	10	6.28%	3.66	82	
39	NORTHPARK	68+56.78	RT	90	13	13	24	23.6	0.54%	1.71	1.50%	10.05	0.68%	12.14	<mark>9</mark> 5	7
40	NORTHPARK	68+98.65	LT	90	15	15	33	18.9	7.34%	5.86	1.50%	10	7.00%	3	83	
41	NORTHPARK	70+34.32	LT	90	15	15	30	16.9	7.87%	4.7	1.50%	10	7.08%	2.19	90	6
42	NORTHPARK	70+98.14	RT	90	10	10	24	11.7	12.00%	0.5	2.00%	10	10.33%	1.17	71	12
43	NORTHPARK	74+61.10	RT	90	13	13	34	14	1.67%	3	1.50%	10	-6.13%	1	91	7
44	NORTHPARK	74+74.11	LT	90	12	12	30	14	1.00%	3	1.00%	10	-7.62%	1	80	7
45	NORTHPARK	75+44.98	RT	90	13	13	35	14	1.00%	3	1.50%	10	2.67%	1	85	5
46	NORTHPARK	76+68.57	LT	90	12	12	35	14	7.33%	3	1.50%	10	7.00%	1	64	
47	NORTHPARK	77+97.57	RT	90	13	13	35	14	1.00%	3	1.50%	10	2.50%	1	85	5

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## CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a  $\mathscr{Y}_8$ " width x  $\mathscr{Y}_4$ " tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

The back of railing must be vertical unless otherwise shown in the plans or approved by the Engineer.

## MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars. Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7" Epoxy coated  $\sim #4 = 2'-5''$ 

## GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement. Rail anchorage details shown on this standard may require

modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail. Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise Reinforcing bar dimensions shown are out-to-out of bar

SHEET 2 OF 2 ×° Bridge Division Standard Texas Department of Transportation TRAFFIC RAIL SINGLE SLOPE TYPE SSTR rlstd014-19.dar TxD0T ск: TxDOT DW: JTR ск: TxDO ⊙TxDOT September 2019 HIGHWA 912 37 232 CS HOU MONTGOMERY 255





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NOTE: TOENAIL WITH ONE 16D GALV. NAIL

6.

TO PREVENT BLOCK ROTATION.

- TRANSITION SECTIONS OF GUARDRAIL.
- FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
- 5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
- AT A RATE OF 25:1 OR FLATTER.
- INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
- 10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
- THAN 150 FT. RADIUS.
- ON THE MPI MAY FURNISH COMPOSITE MATERIAL BLOCKS
- SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
- NOTE: TWO INSTALLATION OPTIONS.
- BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS 1/2" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH . SLAB PLUS 2 1/4" MIN.
- 2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVE SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDEN WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTIHIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENG OF HILTIHIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

NOTE

SPLICE BOLT LENGTH

FBB01 - 1 1/4

FBB02 - 2'

FBB03 - 10"

FBB04 • 18'

## GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING.

2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE

3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/1" WASHER (FWC16o) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.

4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING."

6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.

7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED

8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25

9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.

11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS

12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS

13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION.

14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

> NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.

SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

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*	(DAT) PARTS LIST	QTY
1	STEEL FOUNDATION TUBE	2
2	DAT TERMINAL POST	2
3	CHANNEL STRUT	2
4	TERMINAL RAIL ELEMENT	1
5	SHELF ANGLE BRACKET	1
6	BCT BEARING PLATE	1
$\overline{7}$	BCT POST SLEEVE	1
8	GUARDRAIL ANCHOR BRACKET	1
9	(ROUNDED)W-BEAM END SECTION	1
10	BCT CABLE ANCHOR	1
1	RECESSED NUT, GUARDRAIL	20
12	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
14	5% X 2" HEX HEAD BOLT	8
(15)	5% " X 8" HEX HEAD BOLT	4
16	%" X 10" HEX HEAD BOLT	2
(17)	%" FLAT WASHER	18



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## GENERAL NOTES

CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678

CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THREE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- $\frac{1}{4}$ ") HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE:17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.

CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT

4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.

5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7  $\frac{1}{2}$ " DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.

6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.

THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1FT. REGION OF THE POST, AT LEAST  $\frac{5}{8}$ " IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.

POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.

RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.

BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND %" WASHER (FWC160) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.

FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.

CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.

WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678

UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE

REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.

THE INSTALLATION OF THE TYPE ILCURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.

IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

	HIGH-SPEE(	) TR	ANS	ITION			
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# REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



WOOD BLOCK TO ROUND WOOD POST

7 1/2"

TXDOT FOR ANY PURPOSE WHATSOEVER. OR DAMAGES RESULTING FROM ITS USE.

DISCLAMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT", NO WARRANTY OF ANY KIND IS MADE BY TYDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS



# HIGH-SPEED TRANSITION

SHEET 2 OF 2





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inforced Concrete Mow Strip	Texas Department	of Tra	nsp	ortation		Design Division Standard					
	METAL BEAN (MOW	1 C S	SU. TR	ARD IP)	FE	NCE					
TL-3 MASH COMPLIANT											
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DATE:

### GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720

2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).

3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.

4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.

5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "CALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.

6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.

7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.

8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE. 9. POSTS SHALL NOT BE SET IN CONCRETE.

10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.

11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.

12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.

14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

	ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM
	Α	1	MSKT IMPACT HEAD	MS3000
	в	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
	С	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
	D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
	Ε	1	POST 2 - ASSEMBLY TOP	UHP2A
	F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
	G	1	BEARING PLATE	E750
	н	1	CABLE ANCHOR BOX	S760
	J	1	BCT CABLE ANCHOR ASSEMBLY	E770
	к	1	GROUND STRUT	MS785
	L	6	W6x9 OR W6x8.5 STEEL POST	P621
NOTES: *	м	6	COMPOSITE BLOCKOUTS	CBSP-14
	N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
	0	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
	Р	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
N. **	Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
			SMALL HARDWARE	
ANEL	a	2	5/6" x 1" HEX BOLT (GRD 5)	B5160104A
	b	4	5/6" WASHER	W0516
	с	2	‰" HEX NUT	N0516
	d	25	%" Dio. x 1 4" SPLICE BOLT (POST 2)	B580122
	е	2	5%" Dio.×9" HEX BOLT (GRD A449)	B580904A
	f	3	%" WASHER	W050
	g	33	%" Dia. H.G.R NUT	N050
	h	1	¾" Dio. x 8 1/2" HEX BOLT (GRD A449)	B340854A
	j	1	¾" Dia. HEX NUT	N030
	k	2	1 ANCHOR CABLE HEX NUT	N100
	1	2	1 ANCHOR CABLE WASHER	W100
	m	8	1/2" x 11/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
	n	8	1/2" STRUCTURAL NUTS	N012A
	0	8	1 1/16" O.D. x 916" I.D. STRUCTURAL WASHERS	W012A
	р	1	BEARING PLATE RETAINER TIE	CT-100ST
	q	6	5%/s" × 10" H.G.R. BOLT	B581002
	r	1	OBJECT MARKER 18" X 18"	E3151
				SHEET 1 OF
			Texas Department of Transportation	Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

# SGT(12S)31-18

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DATE

Note: To be paid for as Highest Curb

\_3"

# 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 fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- 4. Round exposed sharp edges with a rounding tool, to a minimum radius of  $\frac{1}{4}$  inch.
- 5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- 6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
- 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 horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- 13. Bar B used as needed to support curb reinforcing steel during concrete placement.











# GENERAL NOTES

- 1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Cutter."
- 2. Concrete shall be Class A.
- 3. When reinforcing bars are used, they shall be No.4. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- 4. Round exposed sharp edges with a rounding tool, to a minimum radius of  $\frac{1}{4}$  inch.
- 5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- 6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
- 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.
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- 11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
- 12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- 13. Bar B used as needed to support curb reinforcing steel during concrete placement.
- 14. See Standard CCCG-21 for additional notes and details.







# GENERAL NOTES

# CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.

- All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
- 3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
- 4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
- 5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
- 6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
- 7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
- 8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
- 9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
- 10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
- 11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
- 12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
- Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
- 14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
- 15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
- 16. Provide a smooth transition where the curb ramps connect to the street.
- 17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
- 18. Existing features that comply with applicable standards may remain in place unless otherwise shown on the plans.

## DETECTABLE WARNING MATERIAL

- 19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
- 20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
- 21. Detectable warning surfaces must be firm, stable and slip resistant.
- 22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
- 23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
- 24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

### DETECTABLE WARNING PAVERS (IF USED)

- 25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
- 26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

## SIDEWALKS

- Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
- 28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
- 29. Street grades and cross slopes shall be as shown elsewhere in the plans.
- 30. Changes in level greater than 1/4 inch are not permitted.
- 31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
- 32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
- 33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
- 34. Sidewalk details are shown elsewhere in the plans.



SECTION VIEW DETAIL CURB RAMP AT DETECTIBLE WARNINGS







PLAN VIEW

PLACEMENT OF STREET FIXTURES

OBSTRUCTION (CONTROLLER CABINET, MAILBOX, ETC.)

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4'X 4'CLEAR GROUND SPACE

REQUIRED AT PUBLIC USE FIXTURES.



HOU MONTGOMERY

265



whatsoever. s use. purpose v from its any Ting for esul the "Texas Engineering Practice Act". No warranty of any kind is made by TxDDT conversion of this standard to other formats or for incorrect results or damages DISCLAIMER: The use of this standard is governed by TXDOT assumes no responsibility for the









NOT	ES:
1. AL	SO SEE SHEET 2 OF 2 FOR DRIVEWAY SLOPES WITH PROPOSED SIDEWALKS.
2. F	OR INTERSECTIONS BUILT WITH CRCP PAVEMENT SEE CRCP DETAIL.
<b>3.</b> F	AST TRACK CONCRETE IS PAID AS DRVWY (CONC) (FAST TRACK).
4. T	HICKNESS OF DRIVEWAY IS 6 INCHES FOR REGULAR AND FAST TRACK CONCRETE.
5. M	AXIMUM SLOPE IS: 12% RESIDENTIAL 8% OTHERS
RIVEWAY	
LEGE	ND:
PCTE	- PORTLAND CEMENT TREATED BASE
JRCF	- JOINTED REINFORCED CONCRETE PAVEMENT
CRCF	P- CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
ACP-	ASPHALTIC CONCRETE PAVEMENT
▼ FOR ST PAVING DETALS SECTIO	REET INTERSECTIONS REFER TO DETAILS AND INTERSECTION 6 FOR REINFORCING STEEL AND N REQUIREMENTS.
* * PROPOS AND/OR	ED LIMIT OF ROADWAY BASE SUBGRADE
OTHER, NO ACP SURFACING	
	SHEET 1 OF 3

Texas Department of Transportation Houston District											
DRIVEWAY DETAILS											
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© TxDOT SEPT.2004	DIST	FED RE	G	PRO	JECT N	0.		SHEET			
REVISIONS	HOU	6						267			
PCTB 3/17 MODIFIED PAVEMENT	С	NUNTY		CONTROL	SECT	JOB		HIGHWAY			
SLOPES	MONTGOMERY			912	37	232		CS			





NOTES:

1. ALSO SEE SHEET 2 OF 3 FOR DRIVEWAY SLOPES WITH PROPOSED SIDEWALKS.
2. FOR INTERSECTIONS BUILT WITH CRCP PAVEMENT SEE CRCP DETAIL.

3. MAXIMUM SLOPE IS: 12% RESIDENTIAL 8% OTHERS

LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

ACP- ASPHALTIC CONCRETE PAVEMENT

- ✗ FOR STREET INTERSECTIONS REFER TO PAVING DETAILS AND INTERSECTION DETAILS.
- \* \* PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE

SHEET 3 OF 3												
Texas Department of Transportation Houston District												
DRIVEWAY DETAILS												
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REVISIONS 11/15 ADDED NOTE FOR	HOU 6						269					
PCTB 3/17 MODIFIED PAVEMENT	CONTROL	SECT	JOB		HIGHWAY							
SLOPES	MON	TGOME	٦Y	912	37	232		CS				



NIMUM IUARED UP	
	-IF NOSE RADIUS IS LESS THAN 3.0', THEN SQUARE UP 4.0' MINIMUM
DETAIL "A"	

NOTE:

LEGEND: R = RADIUS

						SHE	<u>e t</u>	1 OF 1				
Texas Department of Transportation Houston District												
U-TURN CURB DETAIL NEW CONSTRUCTION HOU-U-CURB												
FILE: UCURBNEW.DGN	DN: T X	DOT	ск∶⊺	XDOT	D₩:Tx	DOT	С	K:TxDOT				
© TxDOT 2014	DIST	FED RE	G	PRO	JECT N	0.		SHEET				
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	с	OUNTY		CONTROL	SECT	JOB		HIGHWAY				
	MONT	TGOME	RY	912	37	232		CS				

1. U-TURN CURB MEASURED BY THE FOOT ALONG THE FACE OF THE CURB.

✤ = LIMITS OF PAY FOR U-TURN CURB WIDTH





### GENERAL NOTES

 ${\rm T}_{\sf FS}$  - FAST TRACK CONCRETE PAVING DEPTH AT INTERSECTIONS AND LEAVE OUTS. - NOMINAL CONCRETE PAVING DEPTH AS SHOWN IN THE PLANS. DETERMINE FAST TRACK CONCRETE PAVING DEPTH USING TABLE 1 AND THE NOMINAL CONCRETE PAVING DEPTH "T" SHOWN IN THE PLANS.

2. AT INTERSECTIONS AND LEAVE-OUT LOCATIONS USE THE SAME LONGITUDINAL AND TRANSVERSE BAR SPACING FOR THE FAST TRACK PAVING AREA AS THAT USED FOR THE ADJACENT CONCRETE PAVING DEPTH "T" (EXCEPT BAR SIZE SHALL BE •7 ON SINGLE MAT). FOR SINGLE MAT FAST TRACK PAVING, PLACE THE LONGITUDINAL AND TRANSVERSE BARS FOR THE FAST TRACK PAVING AREA AT THE HORIZONTAL PLANE ELEVATION THAT IS TWO TIE-BAR DIAMETERS LOWER THAN THAT USED FOR THE ADJACENT CONCRETE PAVEMENT DEPTH "T", AS SHOWN IN FIGURE 1. USE SINGLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH SINGLE MAT REINFORCING. USE DOUBLE MAT STEEL IN FAST TRACK PAVING AREAS ADJACENT TO PAVEMENT SLABS WITH DOUBLE MAT REINFORCING.

3. THE REQUIRED FAST TRACK PAVING AREAS WILL BE SHOWN ON THE PLANS. THE CONTRACTOR HAS THE OPTION TO UTILIZE FAST TRACK CONCRETE PAVING AT U-TURNS, AT INTERSECTIONS, AT MINOR STREETS, AND AT DRIVEWAYS WITH FRONTAGE ROAD LEAVE-OUT AREAS THAT ARE NOT SHOWN ON THE PLANS, WITH PRIOR WRITTEN APPROVAL FROM THE ENGINEER. TYPICAL PAVING PLANS FOR THE INTERSECTION OF A MAJOR STREET WITH THE FRONTAGE ROAD ARE SHOWN AS EVOLUTE 2 AND FOR THE INTERSECTION OF A MAJOR STREET WITH THE FRONTAGE ROAD ARE SHOWN AS FIGURE 2, AND FOR THE INTERSECTION OF A MINOR STREET OR DRIVEWAY WITH THE FRONTAGE ROAD AS FIGURE 3. FAST TRACK PAVE THE FRONTAGE ROAD FOR THE FULL FRONTAGE ROAD WIDTH AND PLACE IN STAGES AS REQUIRED.

4. USE ADDITIONAL •6 REINFORCING STEEL BARS (MINIMUM 42 INCHES LONG) AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE FAST TRACK PAVING INTERFACE (T FSWITH THE ADJACENT PAVEMENT SLAB (T).

5. SPLICE LENGTH IS A MINIMUM OF 33 TIMES THE NOMINAL STEEL DIAMETER.

6. PLACE THE CONCRETE PLACEMENT AT A UNIFORM DEPTH THROUGHOUT THE FAST TRACK CONCRETE PAVING AREA.

7. FOR CONTINUOUS SECTIONS OF ROADWAY WHERE FAST TRACK PAVING IS THE PRIMARY PAVEMENT TYPE, USE THE BAR SIZE AND SPACING FROM THE CRCP STANDARDS THAT CORRESPONDS TO THE FAST TRACK SLAB THICKNESS.

8. USE LONGITUDINAL TIE-BARS OF THE SAME SIZE DIAMETER AND SPACING AS THE LONGITUDINAL BAR. A SINGLE PIECE TIE-BAR MAY BE USED IF THE 33 TIMES DIAMETER TIE-BAR PROJECTION DOES NOT INTERFERE WITH THE SAFE HANDLING OF

9. BASE THE DEPTH OF SAW CUTS FOR SAWED JOINTS ON THE FAST TRACK CONCRETE PAVEMENT THICKNESS.

10. THIS STANDARD IS NOT INTENDED TO REPLACE OTHER STANDARDS EXCEPT WHERE SPECIFICALLY STATED HEREIN. FOR PAVING DETAILS NOT SHOWN ON THIS DRAWING, REFER TO THE STANDARD SHEETS FOR CONTINUOUSLY REINFORCED CONCRETE PAVEMENT SHOWN ELSEWHERE IN THE PLANS.

# LEGEND

- ASB ASPHALT STABILIZED BASE
- CRCP CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
- D DIAMETER
- LTS LIME TREATED SUBGRADE
- PCTB PORTLAND CEMENT TREATED BASE

SHEET 1 OF 1

Texas Department of Transportation Houston District										
FAST TRACK CONTINUOUSLY REINFORCED CONCRETE PAVEMENT DETAILS CRCP-FT										
FILE: STDB-4.dgn	DN:		Ск:		DW:		C	K:		
© TxDOT DEC. 2009	DIST	FED RE	G	PRO	JECT N	0.		SHEET		
REVISIONS 5/05 2004 SPECS	HOU	6						272		
2/15 2014 SPECS	С	OUNTY		CONTROL	SECT	JOB		HIGHWAY		
	MONT	GOME	RY	912	37	232		CS		



MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13'-6''	2'-10 5/8''	15'- 6 1⁄4''	24"to 36"
SCI100GM	TL-3	21'-6''	3'-1 1/2"	23'- 0"	24''to 36''

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS							
6" REINFORCED CONCRETE (5 1/2" ANCHOR EMBEDMENT)							
8" UNREINFORCED CONCRETE (5 1/2" ANCHOR EMBEDMENT)							
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 $\frac{1}{2}$ " ANCHOR EMBED.)							
6" ASPHALT OVER 6" COMPACT SUBBASE (16 $\frac{1}{2}$ " ANCHOR EMBED.)							
8" MINIMUM ASPHALT (16 1/2" ANCHOR EMBEDMENT)							

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

	TRANSITION OPTIONS
CONCRETE	VERTICAL WALL
CONCRETE	TRAFFIC BARRIERS
GUARDRAIL	(W-BEAM)
GUARDRAIL	(THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

# GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.

2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.

3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.

4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.

5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.

6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.

7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

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	© TxDOT∶ February 2006	CONT	SECT	JOB		HIG	HWAY		
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	REVISED 03, 2016 (VP)	DIST		COUNTY		5	SHEET NO.		
LOW MAINTENANCE		HOU		MONTGON	<b>IERY</b>		273		

LOC NO.	TCP PHASE	PLAN																		
NO.	TCP PHASE	SHEET NUMBER	LOCATION STA			DIRECTION OF	FOUNDAT	ION PAD	BACKUP SUPPOR	RT		AVAILABLE			MOVE /	RESET	L	LR	R	s s
		NUMBER	LOCATION	STA	LEVEL	(UNI/BI)	PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT	LENGTH	INSTALL	REMOVE	MOVE/ RESET	FROM LOC.•	N	w N	w	N W
1		189	NORTHPARK MAINLANES	19+09.21	TL-3	Ві							1				x			
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LEGEND:

L-LOW MAINTENANCE R-REUSABLE S-SACRIFICIAL N-NARROW W-WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

INTERIM REVIEW ONLY

60% SUBMITTAL

THESE DOCUMENTS ARE FOR INTERIM REVIEW AND NOT FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

RESPONSIBLE ENGINEER: KATE LIGHT, P.E.

TEXAS REGISTRATION NO. 134443 DATE: 4/5/2021

# CRASH CUSHION SUMMARY SHEET

SHEET 1 OF 1

8	FILE: CCSS.dgn	DN: TxDC	DN: TxDOT CH			СК:	
	© T×DOT	CONT	SE	ст	JOB	HIGHW	AY
	REVISIONS	912	3	7	232	CS	5
		DIST		C	OUNTY		
3		HOU		MON	NTGOMERY		
		FEDERAL AID PROJECT		ROJECT	SHEET	NO.	
						27	4



# GENERAL NOTES

- 1. DETAILS FOR 7.0 IN. TO 13.0 IN. THICK CONCRETE PAVEMENT ARE SHOWN ON STANDARD CRCP(1)-17. DETAILS FOR 14 IN. TO 15 IN. THICK CONCRETE PAVEMENT ARE SHOWN ON STANDARD CRCP(2)-17.
- 2. DOWELS AND TIE BARS DOWELS ARE ONE INCH MINIMUM DIAMETER. ENSURE DOWELS ARE FREE OF GREASE AND ARE EPOXY COATED. DO NOT SHEAR CUT DOWELS DURING FABRICATION. PROVIDE TIE BARS PER ITEM 360. FURNISH MULTI PIECE TIE BARS AND DOWELS WITH STOP COUPLINGS AND WITH THREADS ON THE BARS.
- 3. USE CHAIRS OF SUFFICIENT STRUCTURAL QUALITY AND NUMBER TO SUPPORT THE MAT TO THE VERTICAL TOLERANCES. CHAIRS WILL BE APPROVED BY THE ENGINEER AND DO NOT REQUIRE GALVANIZING.
- 4. MECHANICALLY PLACING REINFORCING STEEL IS NOT ALLOWED. NO BARS, DOWELS OR TIE BARS MAY BE VIBRATED INTO POSITION.
- 5. WHERE DIFFERENT THICKNESS PAVEMENTS MEET, TRANSITION THE THINNER SECTION TO THE THICKER SECTION OVER A DISTANCE OF 20 FT. PLACE REINFORCING STEEL WITHIN THE TRANSITION THE SAME AS IN THE THICKER PAVEMENT.
- 6. PERFORM WELDING PER ITEM 448. FURNISH WELDABLE REBAR PER ITEM 440.

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Texas Department of Transportation Houston District									
CONTINUOU CONCRE HOUSTO	SLY TE IN S CRCF	RE PAV SUPP P-HS	INF EM LE	0 E1 M[	RC NT EN	E[ T	D		
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REVISIONS 4/12 CHANGED CTE FROM 6.0 TO 5.0	DISTRICT		PROJECT	NO.			SHEET		
8/14 UPDATE TO REFERENCE CRCP-13 STND. 2/15 REVISED GENERAL NOTES, MINOR	HÔU						275		
4/17 REVISED NOTE +3 OF GENERAL NOTES, MINOR CORRECTIONS		COUNTY	0	CONTROL	SECTION	JOB	HICHWAY		
	MON	ITGOMER	Y	912	37	232	CS		



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	2/15 MINOR CORRECTIONS.	HÔU				_		276
			COUNTY		CONTROL	SECTION	JOB	HIGHWAY
		MON	ITGOMER	Y	912	37	232	CS



	IOTES
HEETS 1.8	LOCK-OUT REQUIRED AT EACH END OF WIDE FLANGE EAM ADJACENT TO %INCH END PLATE WHERE BLOCK-OUT S PLACED ABUTTING CONCRETE PAVEMENT, RIPRAP OR TABILIZED BASE. THE BLOCKED OUT AREA WILL BE ILLED WITH POLYETHYLENE FOAM (6 POUND DENSITY).
S	EE SHEET 3 OF 3 FOR BLOCK-OUT DETAIL.
□ 2. F	OR ADDITIONAL DETAILS ON REINFORCEMENT MEMBER
	UANTITIES AND THE WIDE FLANGE BEAM EE SHEET 2 OF 3.
⊐ 3. r	EPLACE 6 INCH LIME TREATMENT AND 6 INCH
	EMENT TREATMENT WITH CEMENT STABILIZED BACK-
F	ACKFILL EMBANKMENT. SEE "CEMENT STABILIZED
	ACKFILL EMBANKMENT" STANDARD SHEET FOR DETAILS.
> '''	UBSTITUTED FOR 12 INCH CTB, AT CONTRACTOR'S
> 0	PTION, ON APPLICABLE STRUCTURES WITH CEMENT
>	
, \	CTB - CEMENT TREATED BASE
<u> </u>	LTS - LIME TREATED SUBGRADE
J	RCP - JOINTED REINFORCED CONCRETE PAVEMENT
	ASB - ASPHALT STABILIZED BASE
	T - PAVEMENT THICKNESS
BEGIN O	
UK KUAL	
20'-0" MI	<u>N</u>
-EDGE OF SUPPO	DRT SLAB
	e 18° C-C
	<u> </u>
	FOR MORE DETAILS
	FOR CTB & LTS SEE
<u> </u>	01E 31 00 ON SHEET 2 OF 3
6" LTS (SEE N	
SPA 3"	
SLAB	
SLAB	SHEET 1 OF 3
	Tourse Department of Transportation
	Houston District
	WIDE FLANGE PAVEMENT
	IERMINALS
	FOR CONTINUOUSLY & JOINTED
	CONCRETE PAVEMENT DETAILS
	(FUK USE AT BRIDGE END UK PAVEMENT TERMINUS)
	WFPT
	FILE: STDB-3.DGN DN: TXDOT CK: TXDOT DW: TXDOT CK: TXDOT
	REVISIONS         HOU         6         277           02/15 2014 SPECS         HOU         6         277
	COUNTY CONTROL SECT JOB HIGHWAY



	ITEM			PAVEMENT THICKNES	S	
		8" THRU 10"	10 ½ THRU 12	12 ½ THRU 13	14"	
SLEEPER	CONCRETE	0.40 CY/LF	0.40 CY/LF	0.40 CY/LF	0.40 CY/LF	0.40
SLAB	REINFORCING STEEL	49.1 LBS/LF	49.3 LBS/LF	49.6 LBS/LF	49.7 LBS/LF	49.8
SUPPORT	CONCRETE	0.09 CY/LF	0.09 CY/LF	0.09 CY/LF	0.09 CY/LF	0.09
SLAB	_ REINFORCING STEEL	6.3 LBS/LF	6.4 LBS/LF	6.5 LBS/LF	6.6 LBS/LF	6.6
	12" CEMENT TREATED BASE	1.95 CY/	LF (BASED ON JOIN	ITS BEING NORMAL TO	O THE PAVEMENT CEN	TERLINE)

5. THIS STANDARD WILL BE USED WITH SPECIAL SPECIFICATION "CONCRETE PAVEMENT TERMINALS" THIS ITEM WILL BE MEASURED BY THE LINEAR FOOT OF WIDE FLANGE BEAM COMPLETE IN PLACE.

WIDE FLANGE BEAM, SUPPORT SLAB, SLEEPER SLAB, 12 INCHES OF CEMENT TREATED BASE, POLYETHYLENE BONDBREAKER AND ANY EXCAVATION NECESSARY WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CON-SIDERED SUBSIDIARY TO SPECIAL SPECIFICATION ITEM, "CONCRETE PAVEMENT WIDE FLANGE TERMINALS"

- 7. POLYETHYLENE FOAM (6 POUND DENSITY), SAW CUTS, EXPANSION JOINTS, EPOXY COATED DOWEL AND EXPANSION JOINT MATERIALS WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED INCIDENTAL
- 8. THE CONCRETE PAVEMENT, 1 INCH ASB BONDBREAKER, 6 INCH PORTLAND CEMENT TREATED BASE AND 6 INCH LIME TREATED SUBGRADE WILL BE PAID FOR UNDER
- 9. SHEAR CUTTING OF DOWEL BARS IS PROHIBITED.
- 10. EPOXY COATING OF DOWEL BARS PER SPECIFICATION
- 11. CEMENT STABILIZED BACKFILL IS REQUIRED AT

- CRCP CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
- JRCP JOINTED REINFORCED CONCRETE PAVEMENT

15"

0.40 CY/LF

49.8 LBS/LF

0.09 CY/LF

6.6 LBS/LF

SHEET 2 OF 3



STDB-3



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PATH:

reinforcement(WWR) meeting ASTM A497 of equivalent size and spacing may be substituted for Bars A and Bars T.

Epoxy coat reinforcement if pavement reinforcement is required to be epoxy coated.

DESIGNER NOTES: Provide Median Slope in Design Layouts.

SHEET 1 OF 1

Texas Department of Transportation Houston District											
MEDIAN NOSE DETAILS											
			HOU	- <b>M</b> E	E DI	NS					
FILE: stdB13.dgn	DN: NHEB	CK: TxDOT	DW: NHE	3	CK:	TxDOT					
© TxDOT September 2014	DISTRICT		PROJECT			SHEET					
REVISIONS	HOU				280						
03/15 FOR 2014 SECS	C	CONTROL	SECT	JOB	HIGHWAY						
	MONT	GOMERY	912	37	232	CS					



locations, and in accordance with Item 432, "Riprap". Use Class B Concrete, reinforced with No. 3 bars spaced at 18 in. centers each

See the applicable standard sheets for additional details and

Payment for furnishing and placing the grout mixture is subsidiary to the Item 432, "RIPRAP."

6. Place the mow strip the entire length of the guard fence plus any Terminal Anchor Section (TAS) or Single Guardrail Terminal (SGT) to 2 ft.beyond the face of the object marker at the end of the SGT. Do not allow concrete to adhere to the ground line strut shown on the SGT standard sheet.

					SHE	ET 1	OF 1	
Texas Department of Transportation Houston District								
MOW STRIP								
FILE: DN: CK: DW: CK:								
©TxDOT 2014	DIST	DIST FED REG PROJECT NO. SHEE					SHEET	
REVISIONS	HOU	6				281		
03/15 2014 SPECS		COUNTY	CONTROL	SECT	JOB	HIGHWAY		
	MONTGOMERY			912	37	232	CS	
						STE	DE5.DGN	

ΓΥΡΕ	OF	WORK	ITE	MS AND REQUIREMENTS FOR EACH TYPE OF	WORK		
SODDING PERMANENT TEMPORAR' SEEDING SEEDING			Reference Item 161, Streets and Bridges 2014 for specifications, dimensions,	, bse items indicated.			
	1		161-6017 COMPOST MANUF TOPSOIL (BIP)(4'') SY	APPLICATION RATE Item 161.2.1. Compost Manufactured Topsoil (CMT)	Item 161.2. Materials. Submit quality control (QC) documentation to the Engineer. Compost producer's STA certification must be dated to meet STA requirements (certification must be within 30 or 90 days per STA requirements). Lab analysis performed by an STA-certified lab must be dated within 30 days before delivery of the compost.		
<b>\</b>			162-6002 BLOCK SODDING SY	GRASS SPECIES Item 162.2. Materials. Common Bermuda (Cynodon Dactylon)	Item 162.2.1. Block Sod. Use block palletized or roll type sod. <b>REMOVE PLASTIC BACKING FROM ROLL TYPE SOD.</b> Place sod within 48 hours of delivery to site. No exceptions. Place sod with joints alternating on each row to prevent continuous joint lines. Peg sod as needed with wood pegs to hold sod in place. Pegging sod is subsidiary to Item 162.		
	164-6066           DRILL SEEDING (PERM) (WARM OR COOL) SY           Item 164.1. Description           Provide and install seeding as shown on District Standard		164-6066 DRILL SEEDING(PERM)(WARM OR COOL) SY Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH     SEED     MIX       March, April, May, June, July, August, September,     Hulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre Foxtail Millet (Setario italica) - 34.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre	PLS (Pure Live Seed) Provide documentation of PLS requirements per Item 164.2.1. CONSTRUCTION. Cultivate the area to a depth of 4 inches before placing the seed unless otherwise directed. When performing permanent seeding after		
	<b>\</b>		164-6052 BROADCAST SEED(PERM)(SPECIAL MIX) SY Item 164.1. Description Provide and install seeding as shown on District Standard	October     Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre       November, December, January, February,     Unhulled - Bermudagrass (Cynodon dactylon)- 40.0 lbs PLS/acre       Green Sprangletop (Leptochloa dubia) - 72.0 lbs PLS/acre       Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre       Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre	<ul> <li>an established temporary seeding, cultivate the seedbed to a depth of         <ul> <li>4 inches or mow the area before placement of the permanent seed. Plant</li> <li>the seed and place the straw or hay mulch after the area has been</li> <li>completed to lines and grades as shown on the plans.</li> </ul> </li> <li>Drill Seeding. Plant seed or seed mixture uniformly over the area shown         <ul> <li>on the plans at a depth of 1/4 to 1/3 inch using a cultipacker(turfgrass)</li> <li>type seeder. Plant seed along the contour of the slopes.</li> </ul> </li> </ul>		
			164-6051 DRILL SEED(TEMP)(WARM OR COOL) SY Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH SEED MIX March, April, May, June, July, August, September, Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre	Use broadcast seeding method where site conditions prevent drill seeding method. Broadcast Seeding. Distribute the dry seed or dry seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution on top of soil.		
			164-6009 BROADCAST SEED(TEMP)(WARM) SY Item 164.1. Description Provide and install seeding as shown on District Standard	Óctober November, December, January, February,			
	1	1	162-6003 STRAW OR HAY MULCH SY	APPLICATION RATE Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw or hay mulch at 2 tons per acre. Use tacking agent with straw or hay mulch as described on this sheet.	Use straw or hay mulch in conformance with Article 162.2.5, "Mulch." Use biodegradable tacking agents only applied at a rate in accordance with manufacturer's recommendations. Use the following products or an approved equal(see note this sheet): Conweb/Contac Guar Gum, Profile Products Corporation, (307) 655-9565, Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180		
<b>J</b>	<b>J</b>	1	<b>166-6001 FERTILIZER AC</b> Item 166.2. Materials Use fertilizer as shown on District Standard	APPLICATION RATE Deliver and evenly distribute fertilizer at a rate of 4000 lbs/acre.	<ul> <li>Use a NON-(CHEMICAL fertilizer which meets all the following criteria:</li> <li>(1) BRAND NAME must be registered with the Texas State Chemist as a commercial fertilizer.</li> <li>(2) Meets USEPA guidelines for unrestricted use.</li> <li>(3) Derived from biological sources such as, but not limited to: sewage sludge, manures, vegetation, etc.</li> <li>(4) In granular form and essentially dust free.</li> <li>Submit proof of registration and nutrient source to Engineer.</li> <li>Use the following products or an approved equal(see note this sheet): Sigma, SIGMA AgriScience, 281-851-6749</li> <li>Sustanite-standard grade, Automation Nation, Inc., 713-675-4999</li> <li>Milorganite, MMSD, 800-287-9645</li> <li>Agricultural Organic P/L, Ag Org, INC., 713-523-4396</li> </ul>		
<b>V</b>	1	1	168-6001 VEGETATIVE WATERING MG	APPLICATION RATE Item 168.3 Construction. 6000 gallons/acre x 20 consecutive per working day x working days = 120,000 gallons total/acre	Begin watering immediately after installation of seed or sod. Replace, fertilize, and water any seed or sod in poor condition due to the failure to apply the specified amount of water within the time allowed at no expense to the Department.		
	-	-	SEQUENCE OF	WORK	C 2014 HOUSTON DISTRICT		
BLOCK	SOD		PERMANENT SEEDING	TEMPORARY SEEDING	FERTILIZER, SEED, SOD,		
					STRAW, COMPOST, AND WA		

BLOCK SOD	PERMANENT SEEDING	TEMPORARY SEEDING
1.FERTILIZER 2.CULTIVATE SOIL (ITEM 162.3) 3.SOD 4.VEGETATIVE WATERING	1.FERTILIZER 2.COMPOST MANUFACTURED TOPSOIL 3.CULTIVATE SOIL (ITEMS 164.3 AND 161.3.1) 4.PERMANENT SEEDING 5.STRAW OR HAY MULCH 6.VEGETATIVE WATERING	1.FERTILIZER 2.CULTIVATE SOIL (PER ITEM 164.3) 3.TEMPORARY SEEDING 4.STRAW OR HAY MULCH 5.VEGETATIVE WATERING

\_\_\_

# SHEET 1 OF 1

	REVISIONS								
10/2014 UPDATED TO 2014 SPECS	FILE:	FED DIV	STATE	PROJECT NUMBER			SHEET		
	ST2013 MINOR CORRECTIONS	0C1 2014	6	TEXAS					282
		ORIGINAL: DIST COUNT		ſΥ	CONTROL	SECT	JOB	HIGHWAY	
			HÔU	MONTGOM	ERY	912	37	232	cs





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- <del>2</del>

12+00

### NOTES:

1. REFER TO HORIZONTAL ALIGN DATA SHEETS, ROADWAY, FR RD, RAMP, CROSS STREET PLAN





## NOTES:

← TRAFFIC RAIL TOP OF WALL PROP PVMT COPING WITH SURFACE COPING WITH I s/Sh -RELIEF 1" Wall - FRONT FACE OF WALL \$0€ OF WALL PA) Retaining 1 CEMENT-STABILIZED BACKFILL 0.7H BUT NOT LESS THAN 8' \* L IMI TS HNTB\07 FINISHED GRADE ğ - FRONTAGE RD 10:1 0 -2' MIN BELOW EXIST GROUND OR FINISHED GRADE WHICHEVER IS LOWER LEVELING PAD -\*SEE RW(MSE)DD SHEET RETAINING WALL SECTION A-A NTS ÕĒ X - FINISHED GRADE PAULA IKPATT - EXISTING GRND 128626 4 CENSED SS ONAL ENGINE 100 DATE: 4/5/2021 50' 100 SCALE : 1 = 100'-H 1 = 10'-V 90 BY DATE **REVISIO** HNTB The HNTB Companies Infrastructure Solutions Firm Registration Num LAKE HOUSTON REDEVELOPMENT AUTHORITY & TIRZ 10 c/o HUNTON ANDREWS KURTH LLP 600 TRAVIS, SUITE 4200 HOUSTON, TX 77007 벖 CITY OF HOUSTON 80 HOUSTON PUBLIC WORKS NORTHPARK DRIVE RETAINING WALL PLAN AND PROFILE RTW\_02 70 SHEET 2 OF FED. RD. STATE CITY OF HOUSTON WBS HIGHWAY NO DESIGNED: TO CS CHECKED: PI 6 TEXAS SEE TITLE SHEET STATE COUNTY CONTROL SECTION JOB SHEET NO. DISTRICT COUNTY NO. NO. NO. HOU MONTGOMERY 0912 37 232 284 DRAWN: TO CHECKED: PI 4/5/2021 9:41:43 AM











# DRILLING LOG

Contrant or Transportation	County	Montgomery	Hole	RW-01	District	Houst
WinCore	Highway	Northpark Drive	Structure	RETAINING WALL	Date	2-21-20
Version 3.3	C <b>S</b> J	0912-37-232	Station	20+96.64	Grnd. Elev.	82.73 f
			Offset	39.25 RT	GW Elev.	55.00 f

Triaxial Test Properties Texas Cone Lateral Deviator Press. Stress (psi) (psi) MC LL PI Den. Additional Remarks Elev. (ft) Strata Description Penetrometer SAND, Clayey Sand, Dk. Brown to Lt. Grayish Brown, Loose to Med. Dense, Dry to Moist (SC) 6 (6) 5 (6) 11.7 27 15 -200 = 43.9% 5 8 (6) 10 (6) 15.2 20 8 10 -29 (6) 28 (6) -200 = 33.8% 11.9 15 -26 (6) 27 (6) 14.3 23 10 20 -15 (6) 21 (6) 21.0 -200 = 17.8% 25 -12 (6) 14 (6) 25.8 27 18 52.7 30 SAND, Poorly Graded Sand w/ Clay, Brown, Med. Dense to Loose, Wet (SP-SC) 4 (6) 9 (6) 19.3 -200 = 5.1% 47.7 35 40 -45 -50 -55 -Remarks: Boring Locate (GPS): 30°04'8.11"N, 95°14'37.09"W, Elevation Approximate (from Google Earth) Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity. Driller: NR Logger: FR Organization: B2Z Engineering

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1 of 1







# DRILLING LOG

RW-02 Hole County Montgomery District RETAINING WALL Highway Northpark Drive Structure Date Version 3.3 CSJ 0912-37-232 Station 23+21.94 Offset 43.09 RT

Houston 2-21-20 Grnd. Elev. 81.74 ft GW Elev. 72.00 ft

Elev. 0	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Deviator Press Stress	Properties Wet MC_LL_PL_Den	Additional Remarks			
(IT) G	Tenerometer	SAND, Silty, Clayey Sand, Dk.	(psi) (psi)	(pcf)				
		Brown to Grayish Brown, Loose to Very Loose, Dry to Wet (SC-SM)						
5 -	5 (6) 4 (6)			11.2 19 7	-200 = 44.8%			
10	1 (6) 1 (6)			16.8 15 4				
	11 (6) 11 (6)			21.8	200 - 47 6%			
66.7 15		SAND, Clayey Sand, Brown to Lt. Brown, Stiff, Wet (SC)		21.0	-200 - 41.070			
	22 (6) 22 (6)							
61.7 20	22 (0) 22 (0)	CLAY, Sandy Lean Clay, Lt. Grayish		20.8 34 21				
		(CL)						
25	40 (6) 48 (6)			23.6	-200 = 51.3%			
-								
51.7 30	35 (6) 46 (6)	SAND. Poorly Graded Sand w/ Clay.		20.2 35 22				
		Brown, Very Dense, Wet (SP-SC)						
46.7 35	50 (3.5) 50 (3)			21.6	-200 = 9.9%			
-								
40 -								
-								
-								
45 -								
-								
50 – –								
-								
55 -								
Remarks: B	Nonanas Sonny Essaie (or 5), so of thes in, so if shorin, Elevation Approximate (noni Google Laran)							
Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.								
Driller: NR		Logger: FR		Organization:	B2Z Engineering			

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DATE: 4/1/2021




Version 3.3

# DRILLING LOG

RW-03 County Montgomery Hole District RETAINING WALL Highway Northpark Drive Structure Date CSJ 0912-37-232 Station 36+77.93 55.01 RT Offset

Houston 2-26-20 Grnd. Elev. 79.37 ft GW Elev. 57.00 ft

		L	Toyae Cono		Triaxi	al Test		Properti	es	
Elev. (ft)		0 G	Penetrometer	Strata Description	Lateral Press. (psi)	Deviator Stress (psi)	MC	LL PI	Wet Den. (pcf)	Additional Remarks
	-			CLAY, Sandy Lean Clay, Dk. Reddish Brown to Reddish Brown, Stiff, Dry (CL)	- ur /	ur = 17			- (F = 7	
5	-		9 (6) 11 (6)				13.3	35 24		-200 = 51.1%
5	-	1								
	-	C								
941	0 -	2	17 (6) 21 (6)				7.7			-200 = 26.9%
	-			SAND, Clayey Sand, Grayish Brown to Brown, Med. Dense, Dry to Moist (SC)						
1	5 -		20 (6) 27 (6)				17.9	29 17		
	-									
	-									
9.4 2	0 -		6 (6) 9 (6)	CAND Dearth Craded Seadow Class			19.5			-200 = 10.9%
	-			SAND, Poorly Graded Sand W/ Clay, Brown, Loose to Med. Dense, Moist to Wet (SP-SC)						
2	5 -		10 (6) 12 (6)				27.8	26 14		
	-									
	-									
9.4 3	0 -		5 (6) 4 (6)				27.5			-200 = 37.9%
	-			SAND, Clayey Sand, Lt. Brown, Loose to Med. Dense, Wet (SC)						
113	5 -		7 (6) 10 (6)				24.1	37 23		
1.1 0	- -									
	-	1								
4	0 -	1								
	-	1								
4	5 -	1								
	-									
	-	-								
5	0 -	1								
	-									
	-	-								
5	5 -	1								
	-									
	-	ł	1							
6	0 -	1								
Rema	ark	s: B	oring Locate (GPS	i): 30°04'6.00''N, 95°14'19.39''W, Elevation	n Appro:	ximate (fr	om Go	ogle Ea	rth)	
Any g where	prou e th	ınd is in	water elevation info formation was colle	rmation provided on this boring log is repre- ected. The actual groundwater elevation ma	sentative ay fluctua	e of conditi ate due to	ions ex time, c	isting on limatic c	the day a	and for the specific location , and/or construction activity.
Drille	er:	NR		Logger: FR				Organ	ization:	B2Z Engineering

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DATE: 4/1/2021





# DRILLING LOG

RW-04 County Montgomery Hole District Houston RETAINING WALL 2-26-20 Highway Northpark Drive Structure Date Version 3.3 CSJ 0912-37-232 Station 37+76.43 Grnd. Elev. 79.58 ft GW Elev. 53.00 ft 24.69 LT Offset

		1	Tawaa Cana		Triaxi	al Test		Proper	ties	
Ele (ft)	v.	0 G	Penetrometer	Strata Description	Lateral Press. (psi)	Deviator Stress (psi)	MC	LL P	Wet Den. (pcf)	Additional Remarks
	-			SAND, Silty, Clayey Sand, Reddish Brown, Loose to Med. Dense, Dry (SC-SM)		-u				
	6		4 (6) 6 (6)				12.7	15 7		
	5 -									
	_									
9.6	10		24 (6) 26 (6)				13.8			-200 = 33.5%
5.0	-			SAND, Clayey Sand, Reddish Brown to Grayish Brown, Med. Dense, Dry to Moist (SC)						
	- 15		19 (6) 19 (6)				15.7	29 18		
	-									
9.6	- 20 -		5 (6) 8 (6)				21.9			-200 = 11.8%
0.0	-			SAND, Poorly Graded Sand w/ Clay, Lt. Brown, Loose to Med. Dense, Moist to Wet (SP-SC)						
	25 -		26 (6) 22 (6)				27.7	24 13	1	
	-									
	_									
96	30 -		4 (6) 4 (6)				30.8			-200 = 20.7%
0.0	-			SAND, Silty, Clayey Sand, Lt. Brown Loose Wet (SC SM)						
	-			Diowii, Loose, Wei (30-3m)						
4.6	35 -		6 (6) 9 (6)				25.1	22 5		
1.0	-	{								
	_	1								
	40 -									
	-	1								
	-									
	45 -	1								
	-	1								
	_	]								
	- 50 -	1								
	-	1								
	-	1								
	- 55 -	1								
	-									
	-	1								
	60 -									
Ren	nark	s: B	oring Locate (GPS	i): 30°04'6.72''N, 95°14'17.97''W, Elevation	n Approz	kimate (fr	om Go	ogle E	arth)	
Any whe	grou re th	ınd is in	water elevation info formation was colle	rmation provided on this boring log is repre ected. The actual groundwater elevation ma	sentative ay fluctua	of condit	ions ex time, c	isting o limatic	n the day conditions	and for the specific location , and/or construction activity.
Dri	Driller: NR Logger: FR Organization: B2Z Engineering									

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DATE: 4/1/2021





				SHEE	T 1 OF 2		
Texas Department	of Tra	nsp	ortation		Bridge Division Standard		
MECH	MECHANICALLY						
STABILI	STABILIZED EARTH						
RETAL	NIN	IG	WA	LL			
	R	W	(MSE	E)			
FILE: rwstde01.dgn	DN: TXD	OT	CK: TXDOT	DW: JGD	CK: MJG		
CTxDOT March 2010	CONT	SECT	JOB		HIGHWAY		
REVISIONS 04-11: Added Table & Corrosion	912	37	232		NP		
Criteria.	DIST		COUNTY		SHEET NO.		
vi-is: waii embed, (WS) table, retained fill, soil strength.	HOU		MONTGOM	IERY	293		





# **DESIGN PARAMETERS:**

Design of retaining walls shall be based on the following design parameters unless stated elsewhere in the plans

Retained Soil	Unit Wei Ø =
Foundation Soil	Ø -
Select Backfill	Unit Weig Ø -
Cement Stabilized Select Backfill	Unit Wei Ø =

Stress in steel and concrete shall be in accordance The minimum length of earth reinforcements are as

STABILITY CRITERIA:

Stability criteria applies to both dry and drawdown a Factor of safety in sliding along the base of the stru Factor of safety in overturning shall be greater than The base pressure resultant shall fall within the middle The factor of safety against pullout of the earth rei

each level. Pullout resistance shall be determined from

### CORROSION CRITERIA:

The earth reinforcement elements shall be designed AASHTO corrosion rates.

Stress calculations (rupture) shall be done on the cal 75 years. Pullout calculations may be based on non-co

### PRECAST COPINGS:

Wall supplier is to maximize lengths of precast coping lengths (typical). To optimize coping lengths at radiuses favorable to shorter coping sections, shorter lengths m applies only to coping without railing.

### JOINT SEALER:

The joints between coping segments must be sealed Fillers", joint sealing material, Class 4. The joint must be pavement surface, or as directed by the Engineer. The drainage and prevent infiltration into the retaining wall I

## GENERAL NOTES:

Section and elevation shown is for informational purpe

on wall layouts and other plan information. The select backfill specified for use within the mecha horizontally from the back of the panels to a minimum backfill shall extend vertically from the top of the level whichever is lower, to the top of panels.

The uppermost earth reinforcements shall be no mor The lowest level of earth reinforcements shall be no Minimum wire size for earth reinforcements shall be in an earth reinforcement mesh, the smaller wire shall h

larger wire A maximum of four wire mesh configurations (wire shall shall have a unique transverse bar spacing, differing fro reinforcement lengths shall be stepped in increments no

Standard precast concrete panels shall have a maxin Top and bottom panels may exceed these limitations height of any panel shall be 7'-6". Minimum panel thickne offset horizontal joints.

An open joint shall be provided around the perimeter be such that 1) the filter fabric and/or pad materials ar opening is between  $\frac{3}{8}$ " and  $\frac{3}{4}$ ".

A one-piece corner panel shall be provided for wall an chamfered panels will be allowed for angle changes of 3 Concrete coping shall be provided along the top of w other vertical steps along the top of wall. The joints be infiltration of water into the retaining wall backfill. Sealin

"Joint Sealants and Fillers", using Class 4 joint sealant. When obstructions (inlets, drilled shafts, piling, etc.) p

normal locations, provide details and calculations that e same earth reinforcement coverage as that required in earth reinforcements no adjustment in length is needed angles greater than 10 degrees adjust the length of ear reinforcement equivalent to the stated design length fo any alterations made to the soil reinforcements or mod without any soil reinforcements connected to them unle panels which do have supporting Soil reinforcements at to them and as approved by the Engineer

Reinforced concrete must be Class "C", Precast concrete Class "H", Unreinforced concrete Class "A". All reinforcing steel must be Grade 60.

Coping and anchor slabs are considered subsidiary to the Item "Retaining Wall".

These details are to be used in conjunction with the retaining wall layout, standard RW(MSE)DD and other applicable standards.

ing design parameters unit	ess stated elsewhere in the	
/eight = 125 pcf = (4) C = 0 psf		
• ④ C • O psf		
right - See Table 6 - 34 C - 0 psf		
/eight = 125 pcf = 45 C = 0 psf		
with current AASHTO Stan shown on the RW(MSE)DD	dard and Interim Specifications. standard.	
analysis. ucture shall be greater tha or equal to 2.0. e third of the retaining wa nforcements shall be great test data evaluated at 3	in or equalto 1.5. II. er than or equalto 1.5 at 4 inch strain.	
to have a minimum design	life of 75 years, using current	
lculated earth reinforceme orroded section.	nt section remaining after	
g. Precast coping is to be s, end of runs or other wa nay be used pending appro	provided in 10' minimum Il geometric conditions val by the Engineer. This	
in accordance with the D re sealed 3" below and 6" purpose of the joint seali backfill.	MS-6310 "Joint Sealant's and above the adjoining ng is to contain surface	
oses only. Specific geome	try is to be determined based	
nically stabilized earth volu n 2'beyond the end of th ling pad or 4'' below the lo	ume shall extend e earth reinforcements. The select owest earth reinforcement,	
e than 3.0' below the top more than 2.0' above the W7.0. If different longitudi ave at least 50% of the ci	of wall. top of the leveling pad. naland cross wires are used ross sectionalarea of the	
sizes) will be allowed on a por om other configurations by o finer than 12". num height of 6', and a m as necessory to achieve r ess shall be 5". Panels sha	project. Each mesh configuration v a minimum of 3". Earth aximum surface area of 50 sq ft. equired wallgrades. Maximum Illbe arranged to provide	
of the concrete panels. I are not exposed at the wal	The joint configuration shall I face and 2) the design	
igle changes of greater tha 30 degrees or less.	on 30 degrees. Butting of	
wall, at the vertical steps a etween all coping segments ng shall be in accordance v	t bridge backwalls, and at shall be sealed to prevent with the DMS-6310	
revent placement of soil re stablish support for the af the absence of the obstr for skew angles between inth reinforcement to provi or the section of wall. Prov diffications to their normal ess they are connected wi tached	inforcements in their fected panels. Furnish the ruction. For skewed (rotated) 1 and 10 degrees. For skew de a cosine length of the vide calculations that justify placement. Do not use panels th galvanized hardware to adjacent	
	9	SHEET 2 OF 2
	Texas Department of Transportation	Bridge Division Standard
	MECHANICALLY	1
	STABILIZED EAR	ТН
	RETAINING WAL	L

RW(MSE)								
FILE: rwstde01.dgn	DN: TXD	от	CK: TXDOT	DW: JGD	CK: MJG			
©TxDOT March 2010	CONT	SECT	JOB		HIGHWAY			
REVISIONS 04-11: Added Table & Corrosion	912	37	232		NP			
Criteria.	DIST		COUNTY		SHEET NO.			
vi-is: wair embed, (WS) table, retained fill, soil strength.	HOU		MONTGON	<b>IERY</b>	294			





STD J-1







warranty of any for the conversic umer: tuse of this standard made by TxDOT for a he he is

Rail Type (5)	Detail	Precasting Rail with Coping Allowed
T1F/T1W/C1W/T2P/C2P	NARROW	NO
T221/C221/T222	NARROW	YES
T223/C223	NARROW	NO
T401/T402/C402	NARROW	NO
T411/C411	NARROW	NO
T551/T552	WIDE	YES
Т66	NARROW	NO
SSTR	WIDE	YES

### CAST-IN-PLACE COPINGS:

Provide compressible material to isolate precast panel from cast-in-place coping to prevent cracking. Attach compressible material to both sides of precast panel prior to casting concrete for coping. When cast-in-place coping is anchored to reinforced concrete pavement, a

smooth level-up strip must be provided on the top of the precast panels. The purpose of the level-up is to allow the pavement and coping to move longitudinally relative to the wall without causing damage.

Align coping and railing joints with precast panel joints. Optional rail joints are allowed as approved by Engineer. Provide railing construction joints or expansion joints at no greater than 100' spacing.

### PRECAST COPINGS:

Provide a smooth level-up strip on top of the precast panels prior to installation of the coping. Shims may be used on top of the level-up strip to facilitate alignment. Total shim thickness not to exceed 1". Provide precast coping in 10' minimum lengths.

# JOINTED CONCRETE PAVEMENT:

When coping is adjacent to and anchored into jointed concrete pavement, the coping joints must coincide with the pavement joints.

### JOINT SEALER:

Seal joints between coping segments in accordance with Item 438, "Cleaning and Sealing Joints". Provide Class 4 joint seal. Place sealant flush with coping surface. The purpose of the joint sealing is to reduce surface drainage infiltration into the retaining wall backfill. Sealing coping joint is considered subsidiary to other items.

GENERAL NOTES: Details on this sheet are to be used in development of specific details for mounting traffic railing on mechanically stabilized earth (MSE) walls.

The specific details proposed must have strengths equivalent to those shown on this sheet. Areas of particular importance are the connection of the coping to the railing, the strength of the vertical coping leg connecting the railing to the anchor slab, and the connection of the coping to the anchor slab or concrete pavement.

Submit shop drawings for the traffic railing foundations to the Engineer in accordance with Item 423 "Retaining Wall". The shop drawings must include bar bending details.

Precasting of railing with the coping will be allowed as noted in the table on this sheet.

The Contractor's attention is directed to the fact that various configurations of precast coping/railing combinations are covered by patent. The contractor must provide for use of these systems in accordance with Article 7.3.

Provide Class C concrete (f'c=3,600 psi). Provide Grade 60 reinforcing steel.

Provide (#4) longitudinal bars, unless otherwise shown.

Coping and anchor slabs are considered subsidiary to Item 423 "Retaining Wall". Payment for traffic railing is per the linear foot for the appropriate railing type.

			S	HEET	1 OF 1			
Texas Department	of Tra	nsp	ortation	Br Di St	idge vision andard			
RETAIN	RETAINING WALL							
TRAFF	TRAFFIC RAILING							
FOU	FOUNDATIONS							
	R	Ŵ	(TRF)					
FILE: rwstde03-20.dgn	FILE: rwstde03-20.dgn DN: TXDOT CK: TXDOT DW: JTR CK: MPM							
©TxDOT March 2010	CT xDOT March 2010 CONT SECT JOB HIGHWAY							
REVISIONS 01-13: Precast option with Rails.	REVISIONS 912 37 232 NP							
03-18: Cast-In-Place Copings, railing construction and expansion joints.	DIST		COUNTY		SHEET NO.			
02-20: Note 5 added for precast rail option.	HOU		MONTGOMER	Y	299			





# NOTES

RAILING AND ROADWAY SLAB ARE PAID FOR UNDER THE APPROPRIATE ROADWAY ITEMS. MODIFICATIONS TO THE RAIL OR ROADWAY SLAB TO FORM COPING ARE CONSIDERED INCIDENTAL TO THE SQUARE FOOT COST OF THE BID ITEM. "RETAINING WALL".

PLACE THE UPPERMOST REINFORCEMENT STRAPS NO MORE THAN 3.5' BELOW THE TOP OF THE WALL, PLACE THE LOWEST LEVEL OF REINFORCEMENT STRAPS NO MORE THAN 2.0' ABOVE THE TOP OF THE LEVELING PAD.

PROVIDE UNDERDRAINS ONLY AT LOCATIONS SHOWN ON THE PLANS. INCLUDE THE COST OF FURNISHING AND INSTALLING UNDERDRAINS IN THE UNIT PRICE BID FOR "RETAINING WALL."

THE REINFORCED VOLUME CONSISTS OF CEMENT STABILIZED BACKFILL IN ACCORDANCE WITH ITEM 132 AND HOUSTON DISTRICT SPECIAL PROVISION (132-001).

PAYMENT HEIGHT SHOWN IN RETAINING WALL LAYOUTS IS CONSIDERED THE MINIMUM HEIGHT TO BE FURNISHED. ADDITIONAL WALL FURNISHED BELOW PAYMENT LINE DUE TO DETAILING OR FABRICATOR DESIGN REQUIREMENTS WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED INCIDENTAL. THE CONTRACTOR MAY USE A DIFFERENT TYPE OF TRAFFIC RAIL AND COPING ON RETAINING WALLS IF THE DESIGN AND DETAILS ARE APPROVED BY THE ENGINEER.

WHEN OBSTRUCTIONS (INLETS, DRILLED SHAFTS, PILING, ETC.) PREVENT PLACEMENT OF SOIL REINFORCEMENTS IN THEIR NORMAL LOCATIONS, PROVIDE DETAILS AND CALCULATIONS THAT ESTABLISH SUPPORT FOR THE AFFECTED PANELS FURNISH THE SAME STEEL AREA OF SOIL REINFORCEMENTS AS THAT REQUIRED IN THE ABSENCE OF THE OBSTRUCTION. PROVIDE CALCULATIONS THAT JUSTIFY ANY ALTERATIONS MADE TO THE SOIL REINFORCEMENTS OR MODIFICATIONS TO THEIR NORMAL PLACEMENT. DO NOT USE PANELS WITHOUT ANY SOIL REINFORCEMENTS CONNECTED TO THEM UNLESS THEY ARE CONNECTED WITH GALVANIZED HARDWARE TO ADJACENT PANELS WHICH DO HAVE SUPPORTING SOIL REINFORCEMENTS ATTACHED TO THEM AND AS APPROVED BY THE ENGINEER.

## DESIGN PARAMETERS

BASE RETAINING WALL DESIGN ON THE FOLLOWING DESIGN PATTERNS:

EMBANKMENT MATERIAL (BEHIND CEMENT STABILIZED BACKFILL) CEMENT STABILIZED BACKETLL

UNIT WEIGHT - 125 PCF Ø 30°C = Ø PSF KA = 0.333

UNIT WEIGHT = 125 PCF Ø 45℃ = Ø PSE

ALLOWABLE STRESSES IN STEEL AND CONCRETE ARE IN ACCORDANCE WITH CURRENT A.A.S.H.T.O. AND INTERIM SPECIFICATIONS.

THE MINIMUM LENGTH OF REINFORCEMENT STRAPS FOR A 0.55H STEP WALL IS SIX FEET AND FOR A 0.70H WALL IS EIGHT FEET.

# EXTERNAL STABILITY CRITERIA

PROVIDE A FACTOR OF SAFETY IN SLIDING ALONG THE BASE OF THE STRUCTURE OF GREATER THAN OR EQUAL TO 1.5. PROVIDE A FACTOR OF SAFETY IN OVERTURNING OF GREATER THAN OR EQUAL TO 2.0.

THE MAXIMUM ALLOWABLE BEARING PRESSURE IS  $\frac{1}{2}$ THE ULTIMATE BEARING CAPACITY OF THE FOUNDATION.

THE WIDTHS SHOWN HEREIN ARE CONSIDERED MINIMUM UNLESS A LARGER WIDTH IS SPECIFIED ON THE WALL PLANS OR REQUIRED BY THE FABRICATOR'S DETAILS.

ENSURE THE BASE PRESSURE RESULTANT FALLS WITHIN THE MIDDLE THIRD OF THE RETAINING WALL.

PROVIDE A FACTOR OF SAFETY AGAINST PULLOUT OF THE EARTH REINFORCEMENTS OF GREATER THAN OR EQUAL TO 1.5 AT EACH LEVEL. DETERMINE PULLOUT RESISTANCE FROM TEST DATA EVALUATED AT%INCH STRAIN.

SHEET 1 OF







				WALL SUN	IMARY					
MSE Retaining Wall	Begin Station	End Station	Retained Soil Friction Angle	Foundation Soil Friction Angle 2	Ground Improvement 3	Min Earth Reinforcement Length 4	Min Wall Embedment 7	Underdrain Required 5	Drawdown Analysis 6	Bend Widt
RTW_01	ALL	ALL	30 Degrees	30 Degrees	Not Required	8' or 70% Wall Ht	2'	Yes	Not Required	ź
	ALL	ALL	30 Degrees	30 Degrees	Not Required	8' or 70% Wall Ht	2'	Yes	Not Required	2
	ALL	ALL	30 Degrees	30 Degrees	Not Required	8' or 70% Wall Ht	2'	Yes	Not Required	
	ALL	ALL	30 Degrees	29.5 Degrees	Not Required	8' or 70% Wall Ht	2'	Yes	Not Required	1
	ALL	ALL	30 Degrees	29.5 Degrees	Not Required	8' or 70% Wall Ht	2'	Yes	Not Required	
RTW_06	ALL	ALL	30 Degrees	29.5 Degrees	Not Required	8' or 70% Wall Ht	2'	Yes	Not Required	
			-					-		
		1		1	1			1		



1 Indicate limits for which the stated soil design requirements/assumptions are applicable.

- 2 Retained and Foundation friction angle listed should be based on local experience or measured/correlated long term strength values.
- (3) Indicate if ground improvement is required or not required. If shown as required, refer to Ground Improvement Detail(s) for additional information.
- (4) Indicate on table minimum length and length ratio required. The minimum default length of earth reinforcements shall be either 8'-0" or 70% of the wall height, whichever is greater. Wall height and design wall height may differ depending on project geometry and loading conditions. Note: Wall height at bridge abutments is equal to the distance between the top of leveling pad and finished grade at the bridge abutment backwall.
- 5 Indicate if underdrain is required or not required.
- 6 Indicate if rapid drawdown analysis is required.
- OGuidance to wall designer of record for determination of minimum wall embedment: Unless noted elsewhere in the plans, the minimum embedment provided from the top of leveling pad to finish grade shall be 1' for level ground where there is no potential for erosion or future excavation or 2' for sloping ground (4.0H:1.0V or steeper) or where there is potential for removal of soil in front of the wall.
- $^{igodol{8}}$ Horizontal Bench width at base of wall varies. Use the following criteria to establish base width. A = 2.0' Min for  $X \ge 4$ . or A = 4.0' Min for  $X \le 4$ .
- Applicable to both drawdown and dry condition.

SPECIAL NOTES: This sheet is to be filled out by the wall designer of record at time of plan preparation to provide soil strength parameters for the design of the specified walls. The completed sheet shall be signed, sealed, and dated by a licensed Professional Engineer.

					SHEE	T 1 OF 1
	Texas Department	of Trai	nsp	ortation	B D S	ridge Vivision tandard
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STONAL CONTRACTOR	RI	N(N	15	SE)DD	)	
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DATE:4/1/2021 827 ENCINEEPING	CTxDOT January 2013	CONT .	SECT	JOB		HIGHWAY
EGISTRATION NUMBER F-11187	REVISIONS	912	37	232		NP
		DIST		COUNTY		SHEET NO.
		HOU		MONTGOMERY	,	303



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to prevent cracking. Attach compressible material to both sides of precast panel prior

level-up strip must be provided on the top of the precast panels. The purpose of the level-up is to allow the pavement and coping to move longitudinally relative to the wall

Provide Class "C" concrete (f'c=3,600 psi) for Illumination Pole Bracket and CIP coping.

required if luminaire mounting height exceeds 100 ft above average surrounding terrain The type and size of conduit, the anchor bolt circle diameter, and the number and location of brackets is shown elsewhere on the plans. Brackets found to conflict with other components of the retaining wall may be relocated if necessary and as directed

The anchor bolts, nuts, washers, and anchor bolt plates are subsidiary to the Item "Roadway Illumination Assemblies".

SHEET 1 OF 2							
Texas Department of Transportation							
LIGHTING BRACKET FOR MSE RETAINING WALL TRAFFIC RAIL FOUNDATION RW(LB)							
FILE: rwstde14-19.dgn	DN: TXD	OT	CK: TXDOT DW:	TXDOT	CK: TXDOT		
CTxDOT March 2010	CONT	SECT	JOB		HIGHWAY		
REVISIONS	912	37	232		NP		
4-15. Fables and sufficient box Ebeation. 4-19: Added anchor bolt information.	DIST		COUNTY		SHEET NO.		
	HOU		MONTGOMER	Y	304		



No warranty of any lity for the conversion ractice no res<sub>i</sub> xas Engii TxDOT by i hat 'nel 'Se fou gov DISCLAIMER: The use of this standard is kind is made by TxDOT for any

ЭN		ESTIMATED QUANTITIE.	S~ONE	BRACKET
M	CENTER HOLE	ITEM	UNIT	QUANT
SIZE	ANCHER BOLT PLATE	CONCRETE (1)	СҮ	0.2
	IN	REINFORCING STEEL (1)	LB	146
	9 ½	STRUCTURAL STEEL (1)(12)	LB	112
3 <sup>1</sup> /2"	10 ¥2	CONDUIT (13)	LF	4







1 1/2