

# CITY OF LUCAS

## CONSTRUCTION PLANS FOR

# WEST LUCAS ROAD WIDENING AND OVERLAY PROJECT



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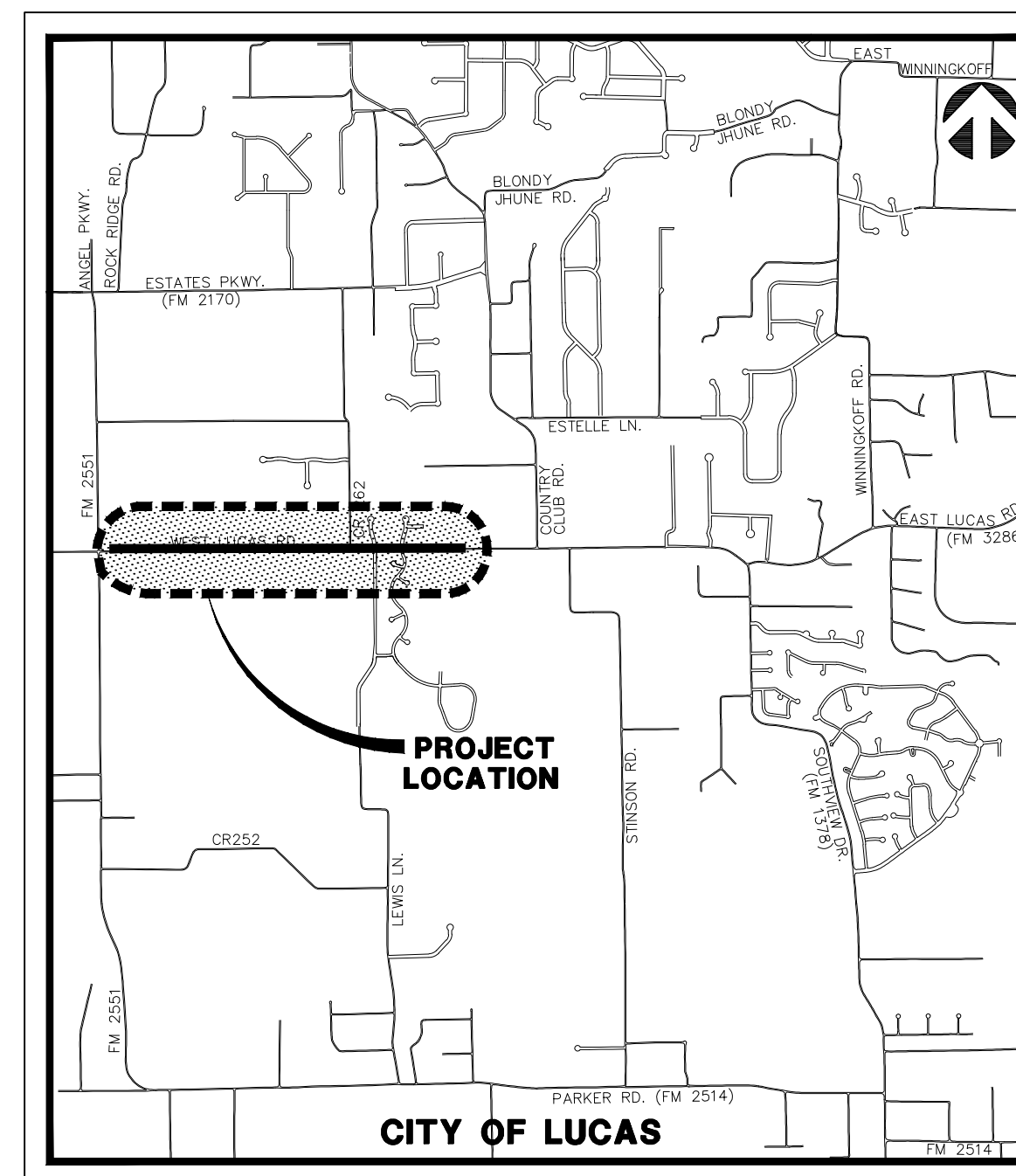
MAYOR  
JIM OLK

CITY COUNCIL

TIM BANEY	STEVE DUKE
PHILIP LAWRENCE	WAYNE MILLSAP
DEBBIE FISHER	KATHLEEN PEELE

CITY MANAGER  
JONI CLARKE, CPM

PUBLIC WORKS DIRECTOR/CITY ENGINEER  
STANTON FOERSTER, P.E.



VICINITY MAP

This Record Drawing is a compilation of the sealed engineering drawing for this project as modified by addenda, change orders, and information furnished by the Owner and/or Contractor (REYNOLDS ASPHALT & CONSTRUCTION COMPANY). The information shown on the record drawing that was provided by the Contractor or others not associated with the Engineer, cannot be verified for accuracy or completeness. The original sealed engineering drawings are on file at the office of:  
**BW2 Engineers, Inc.**  
 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

ENGINEER:



**BW2 ENGINEERS, INC.**

1919 S. SHILOH ROAD  
 SUITE 500, L.B. 27  
 GARLAND, TEXAS 75042  
*Firm Registration No. F-5290*

OWNER:

CITY OF LUCAS  
 665 COUNTRY CLUB ROAD  
 LUCAS, TEXAS 75002

BW2 JOB NO. 13-1623

APRIL 2017

THE SEAL THAT ORIGINALLY APPEARED ON THIS DOCUMENT WAS AUTHORIZED BY JAMES F. WALDBAUER TEXAS P.E. 65670 ON 4/10/17. ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION OF THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT.

CONTRACTOR

REYNOLDS ASPHALT & CONSTRUCTION COMPANY  
 COMPLETED AUGUST 2018

"REVISED PER CONTRACTOR MARKUPS"



**GENERAL NOTES:**

- It is the CONTRACTOR's responsibility to maintain neat and accurate plans of record.
- The CONTRACTOR is responsible for maintaining adequate site drainage throughout the duration of this project.
- The CONTRACTOR is responsible for obtaining all necessary permits and approvals before construction begins.
- The CONTRACTOR shall replace all fence removed during construction in as good as or better condition than before construction.
- The CONTRACTOR shall take all necessary precautions to ensure that electric power and telephone poles are either moved to a safe location by the affected utility company or not disturbed during construction. All costs incurred for moving electric power and telephone poles shall be included in the price bid for the construction of the project.
- The CONTRACTOR shall restore all property including driveways, public streets, sidewalks, public utilities, franchise utilities, private utilities, and all other improvements removed or damaged inside and outside the project limits during construction to as good as or better condition than before construction. Restoration shall be made immediately after the property no longer interferes with construction. All costs incurred for restoring any of the above items shall be included in the price bid for the construction of the project.
- The information shown on these drawings concerning type and location of underground and other utilities is not guaranteed to be accurate or all-inclusive. The CONTRACTOR is responsible for making his own determinations as to the type and location of underground utilities and other utilities as may be necessary to avoid damage thereto.
- The CONTRACTOR shall not place fill or waste material on any private property without prior written permission from the ENGINEER. No excess excavated material shall be deposited in low areas or along natural drainage ways that will restrict the natural flow of water. If the CONTRACTOR places excavated material in low areas that will cause flood damage, CONTRACTOR will be responsible for all damage resulting from such fill, and he shall remove the fill at CONTRACTOR's expense.
- All streets within the scope of the Contract shall be kept accessible to fire trucks, ambulances and other emergency vehicles.
- The CONTRACTOR shall be responsible for public safety during the duration of construction. All barricades, warning signs, lights, devices, etc., for the guidance and protection of traffic and pedestrians must conform to the installation shown in 2011 Revision 2 Texas Manual of Uniform Traffic Control Devices, as currently amended by the Texas Department of Transportation. CONTRACTOR shall at all times provide barricades, warning signs and lighting adequate to safeguard the public from any hazards resulting from open trenches during non-work hours.
- Filter fabric fence for erosion control shall be provided in accordance with specifications and as shown on the plans and in accordance with the EPA regulations.
- The CONTRACTOR shall use the public right-of-ways and existing utility easements for access to the job site.
- The CONTRACTOR shall select the subcontractor to be utilized for testing and lab work. The CONTRACTOR shall be responsible for paying for testing and lab work. Selection of subcontractor for this purpose will be subject to approval by the OWNER. Testing referred to herein includes compaction testing, which shall be required on this project.
- The CONTRACTOR shall keep excavated trenches free of groundwater during construction. If necessary, the CONTRACTOR shall utilize dewatering procedures in order to control groundwater during construction such that it does not affect his construction work.
- The CONTRACTOR shall provide means for adequately controlling and avoiding soil erosion during construction. The CONTRACTOR shall not store spoil in drainage ways during construction.
- All disturbed earth areas are to be finish graded to original or proposed contours, fertilized and either hydromulched with bermuda seed or covered with block sod according to NCTCOG specifications immediately after construction. Backfill to be select material free of rock and other debris. CONTRACTOR shall thoroughly water the hydromulch or block sod immediately after placement. Block sod shall match the existing type of grass on a case by case basis. There shall be no separate pay for matching each type of grass. The CONTRACTOR shall also be responsible for continued maintenance and watering of the newly hydromulched or sodded areas until the entire project is completed and accepted by the City of Lucas. Watering of the bermuda hydromulch or block sod shall be done in a manner and quantity as directed by City of Lucas field representative.
- No existing sprinkler/irrigations systems have been shown on the plans; however, they may exist in certain areas. It is the CONTRACTORS responsibility to locate any existing irrigation systems within the project limits and determine if they will be affected by this construction. If CONTRACTOR encounters any sprinkler systems during construction, he shall repair and/or replace in as good as or better condition than before construction. All costs incurred for restoring any sprinkler/irrigation systems shall be included in the price bid for the construction of the project.
- The CONTRACTOR shall maintain adequate sanitary facilities for use by workers throughout construction.
- The CONTRACTOR shall conform to the Occupational Safety and Health Administration's (OSHA) standards for trench safety that are in effect during the period of construction.
- All materials and workmanship shall conform to the City of Lucas Standards and Specifications and the North Central Texas Council of Government (NCTCOG) Standards and Specifications, except as noted. In the event of a conflict, the City of Lucas Standards and Specifications shall govern.
- No existing trees shall be removed without approval of the City of Lucas.
- CONTRACTOR shall provide all necessary construction staking.
- CONTRACTOR's working hours shall be in accordance with the provisions of the current City Ordinance governing hours of construction work in the City.
- The CONTRACTOR shall assume responsibility for protection of public utilities in the construction of this project. All manholes, valve boxes, fire hydrants, etc., must be adjusted to proper line and grade by the CONTRACTOR prior to and/or after placing any permanent paving. The CONTRACTOR shall also be responsible for support of existing utility poles, street signs, etc., when excavating in the vicinity of such poles.

**GENERAL NOTES CONT'D.:**

- Driveways that are disturbed during construction shall be restored to as good as or better condition than they were prior to construction and materials utilized to restore the driveway shall be the same material as what the driveway is presently made of. All costs incurred for removing and replacing driveways and/or driveway culverts shall be included in the price bid for the construction of the project.
- The CONTRACTOR shall phase his daily work schedule so that all driveway crossings are to be complete prior to the end of the day. No driveway crossings are to be left open overnight. During installation of the construction, the CONTRACTOR shall be prepared to provide access across trenches and driveways at all times in case of emergency.
- The CONTRACTOR is responsible for keeping streets, parking areas, sidewalks, etc., adjacent to the project free of mud and debris from construction.
- The City of Lucas Public Works Department is to be notified 48 hours (2 working days) prior to any construction of paving in rights-of-way and easements.
- Arrangements for construction water shall be made through the City of Lucas.
- All locations of underground utility lines are approximate. CONTRACTOR shall contact the proper utility companies at least 48 hours prior to construction, shall inform them of beginning of construction and shall make arrangements to have utilities located by flagging. Flagging of utilities shall be completed prior to beginning construction.
- Construction sites shall be secure at all times. Safety precautions shall be taken to protect the public from any injury which might result from construction activities.
- As part of bid item, "EROSION CONTROL", the CONTRACTOR shall be responsible for implementing any and all erosion control measures as needed to control runoff of siltation from the project site. This shall include, but is not limited to, silt fencing, rock berms, etc. The CONTRACTOR shall maintain these erosion control measures as required until the construction is completed and sod has been placed over disturbed areas.
- Hydromulch or block sodding shall be installed to match surrounding areas where the ground is disturbed in the construction area. City reserves the right to provide direction with regard to areas to be hydromulched or sodded. The CONTRACTOR will receive payment only for the square yards of area actually hydromulched or sodded in the construction area.
- If any conflicts with other utilities occur during the construction activities, the CONTRACTOR shall immediately notify the City's representative and shall make adjustments as necessary with City's concurrence.
- Locations of pipelines shown on he plans are approximate and are to the best knowledge of the engineer. CONTRACTOR will make all repairs to existing lines damaged during construction work.
- There is no separate pay resulting from any of the work required as a result of the requirements included in these general notes, unless otherwise noted. All work required shall be included in the unit price bid for the project.

**GENERAL TRAFFIC CONTROL NOTES**

- All traffic control design and implementation shall be completed by the CONTRACTOR and be completed in accordance with the standard TXDOT details provided herein. See sheets 32-47. All traffic control items as required by these plans and specifications shall be paid for by the bid item "Construction Barricading/Signing/Traffic Control".
- All temporary signs, markings, cones, channelizing devices, warning lights and barricades shall be in accordance with the current State of Texas Manual on Uniform Traffic Control Devices (MUTCD).
- Type "A" warning lights shall be placed on all advance warning signs. In addition, flags shall be placed on all advance warning signs that detour traffic.
- Any existing conflicting markings shall be removed prior to shifting traffic.
- All temporary pavement markings required during construction shall be of the removable type. Temporary markings and striping may be required to transition travel lanes between construction phases. All pavement markings and striping shall be reflective.
- The spacing of signs and channelization devices may be adjusted to fit the geometric conditions encountered, such as driveways, intersecting roadways, vertical and horizontal alignment, etc., as approved by the City of Lucas.
- Advance warning signs shall not be displayed more than forty-eight (48) hours before physical construction begins. Signs may be erected up to one week before needed, if the sign face is fully covered.
- Use of barricades, portable barrier rails, vertical panels, and drums shall be limited to the immediate areas of construction where a hazard is present. These devices shall not be stored along the roadway within thirty (30) feet of the edge of the traveled way before or after use unless protected by guardrail, bridge rail, and/or barriers installed for other purposes. These devices shall be removed from the construction work zone when the City of Lucas determines they are no longer needed. Where there is insufficient right-of-way to provide for this thirty (30) foot setback, the City of Lucas shall approve alternate locations.
- The posted speed for warning signage is to be determined at the site by the City of Lucas.
- Reduced speed warning signage should be placed prior to and at regular intervals within the construction zone.
- As part of the bid item, "Construction Barricading/Signing/Traffic Control," the CONTRACTOR is required to submit a traffic control plan for construction a minimum of 3 days prior to changes in traffic handling or movement. These plans are to be reviewed and approved by the City of Lucas prior to construction of that phase.
- The CONTRACTOR shall accommodate existing traffic during construction and shall maintain at least one open lane of traffic at all times. Use of flag men, barricades, vertical panels, etc. shall be required and shall be considered subsidiary to "Construction Barricading/Signing/Traffic Control".
- CONTRACTOR shall be required to place temporary pavement markings and/or buttons as needed to maintain traffic in a safe and efficient manner after removal of existing markings. These temporary markings shall not be paid for separately but shall be considered subsidiary to "construction barricading/signing/traffic control".

**!! CAUTION !!**

THERE ARE EXISTING AND/OR PROPOSED UTILITIES IN PROJECT AREA. UTILITY INFORMATION SHOWN ON PLANS REPRESENTS APPROXIMATE LOCATIONS OF EXISTING UTILITIES AND IS NOT NECESSARILY ALL-INCLUSIVE. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXACT LOCATIONS OF ALL EXISTING UTILITIES AND SHALL BE REQUIRED TO PROTECT UTILITIES TO AVOID DAMAGE.

**PRIOR TO ANY EXCAVATION, CONTRACTOR SHALL CONTACT DIG-TESS, TEXAS ONE CALL, LONE STAR NOTIFICATION AND OTHERS AS REQUIRED TO LOCATE EXISTING UTILITIES.**

CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE 48 HOURS PRIOR TO CONSTRUCTION.

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 (972) 864-8200  
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 10/01/2018

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NO.	DATE	REVISION	REVIEWED

DRAWN:                      **BW2**  
 DESIGN:                    **MRB**  
 REVIEWED:                 **JFW**  
 SCALE:                    **NO SCALE**  
 DATE:                      **APRIL 2017**  
 DWG. NAME:              **1623GENNOTE**



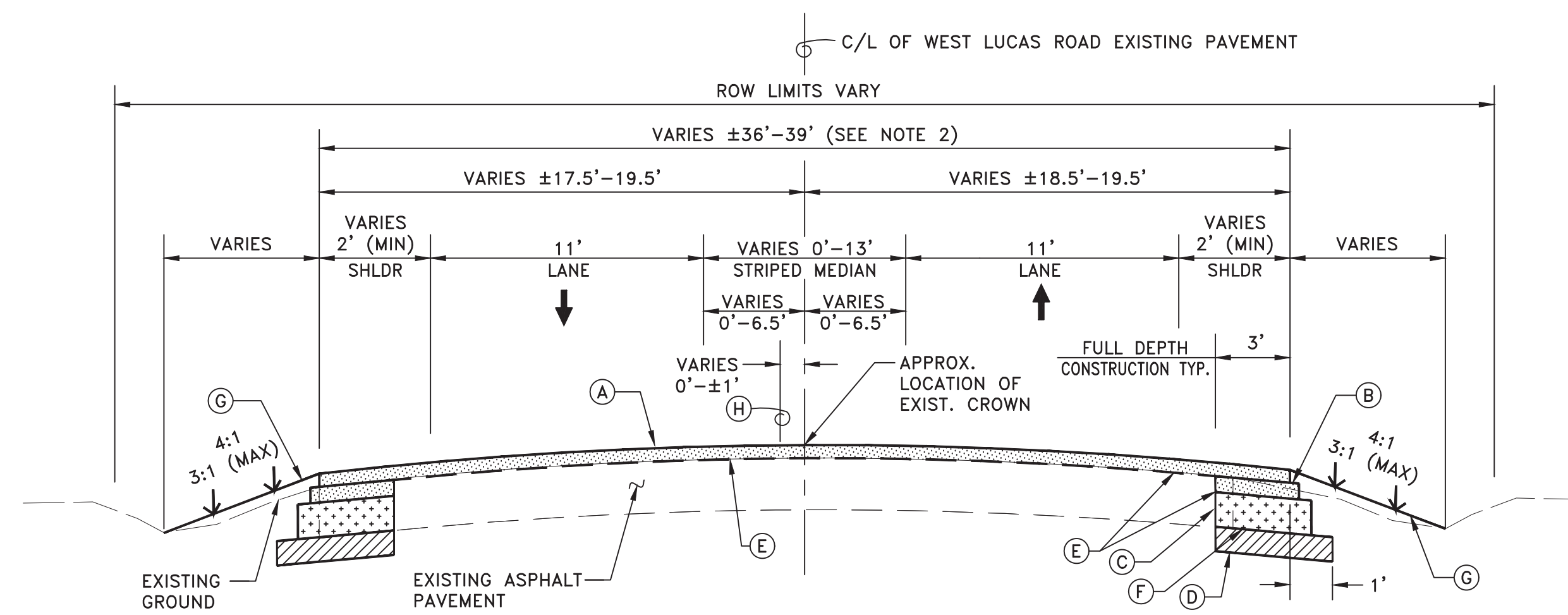
**BW2 ENGINEERS, INC.**  
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 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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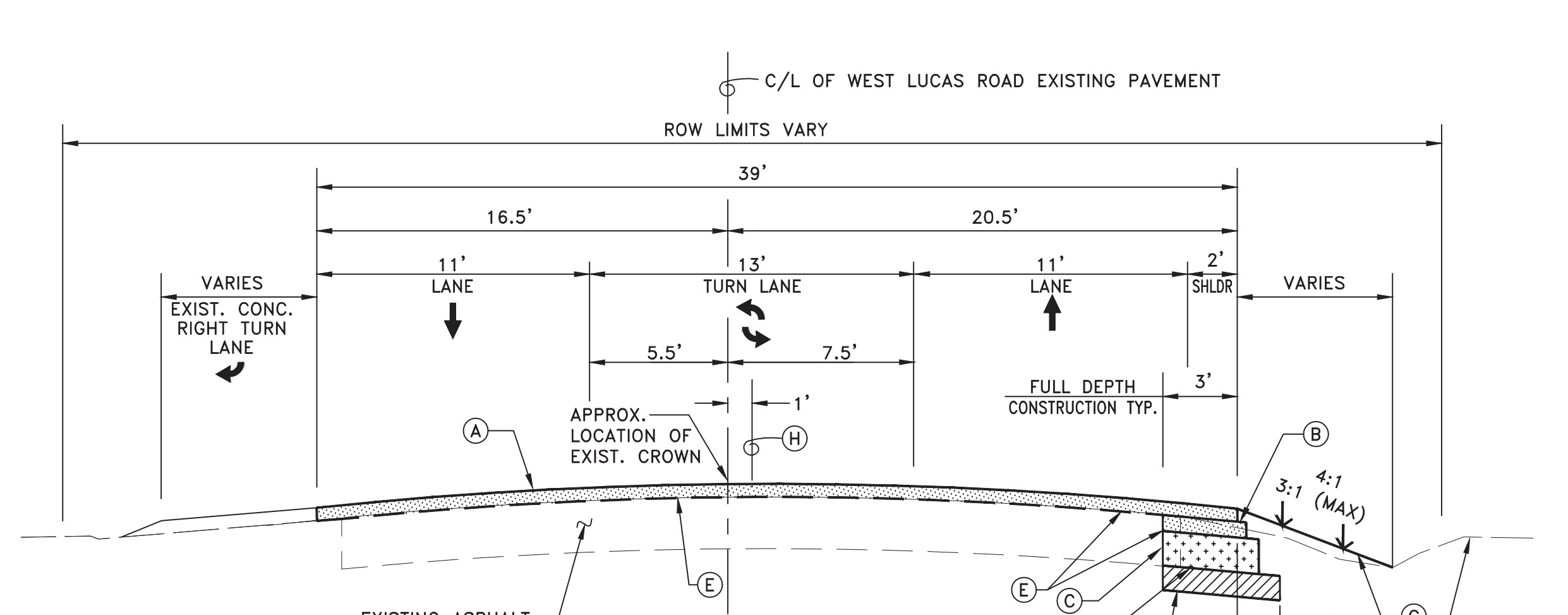
**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 GENERAL NOTES  
 CITY OF LUCAS**

SHEET NO. **2**  
 OF **51** SHEETS  
 JOB NO. **13-1623**

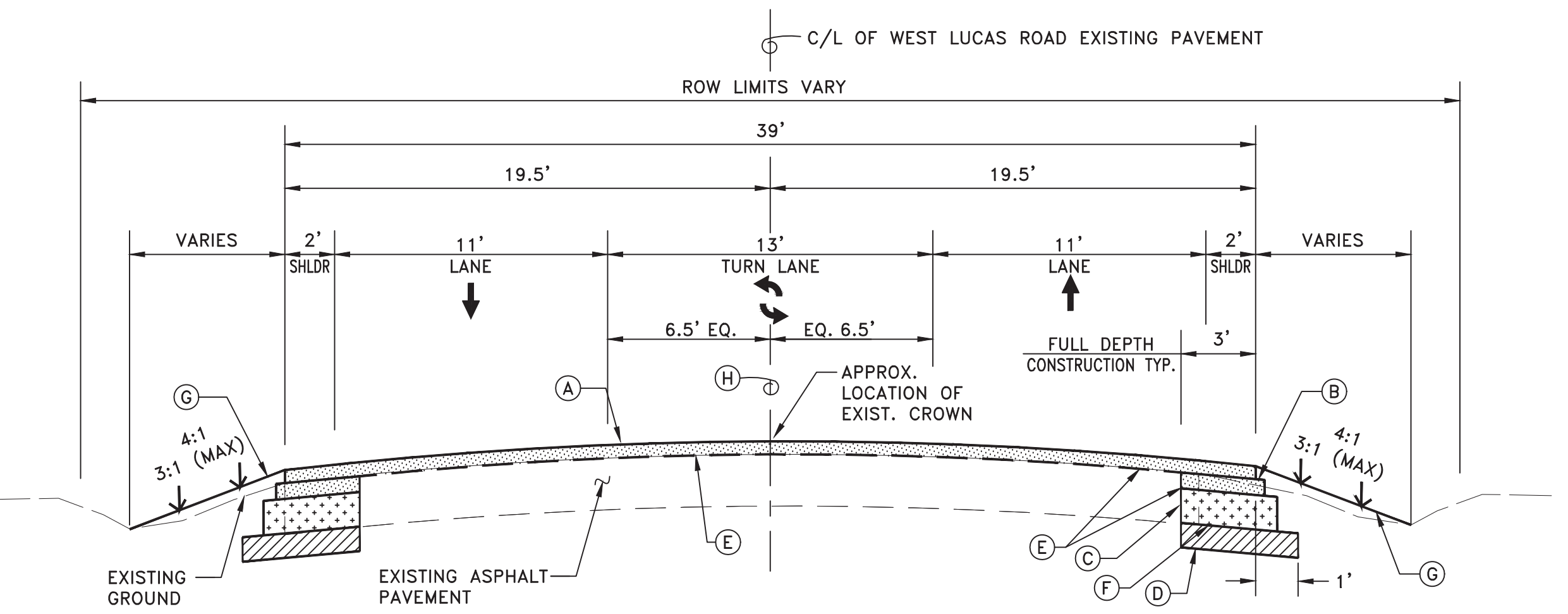




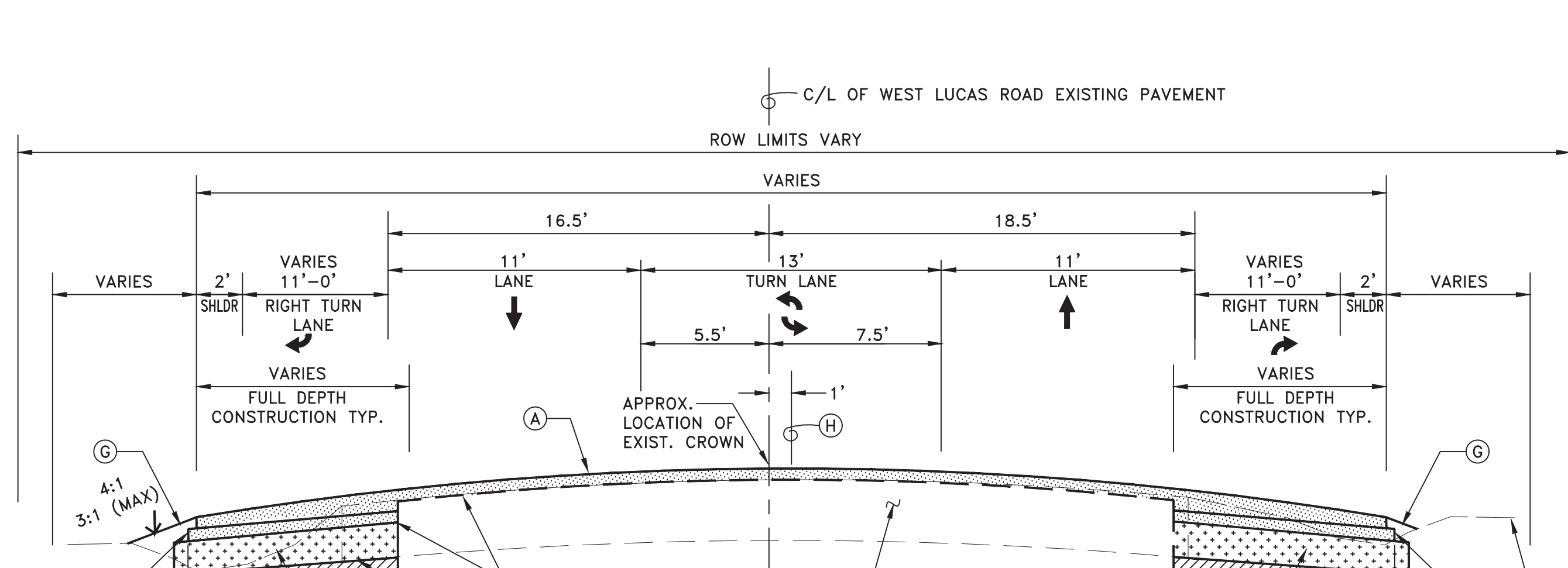
1 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 26+50.00 TO STA. 29+35.01  
STA. 36+55.00 TO STA. 40+38.04



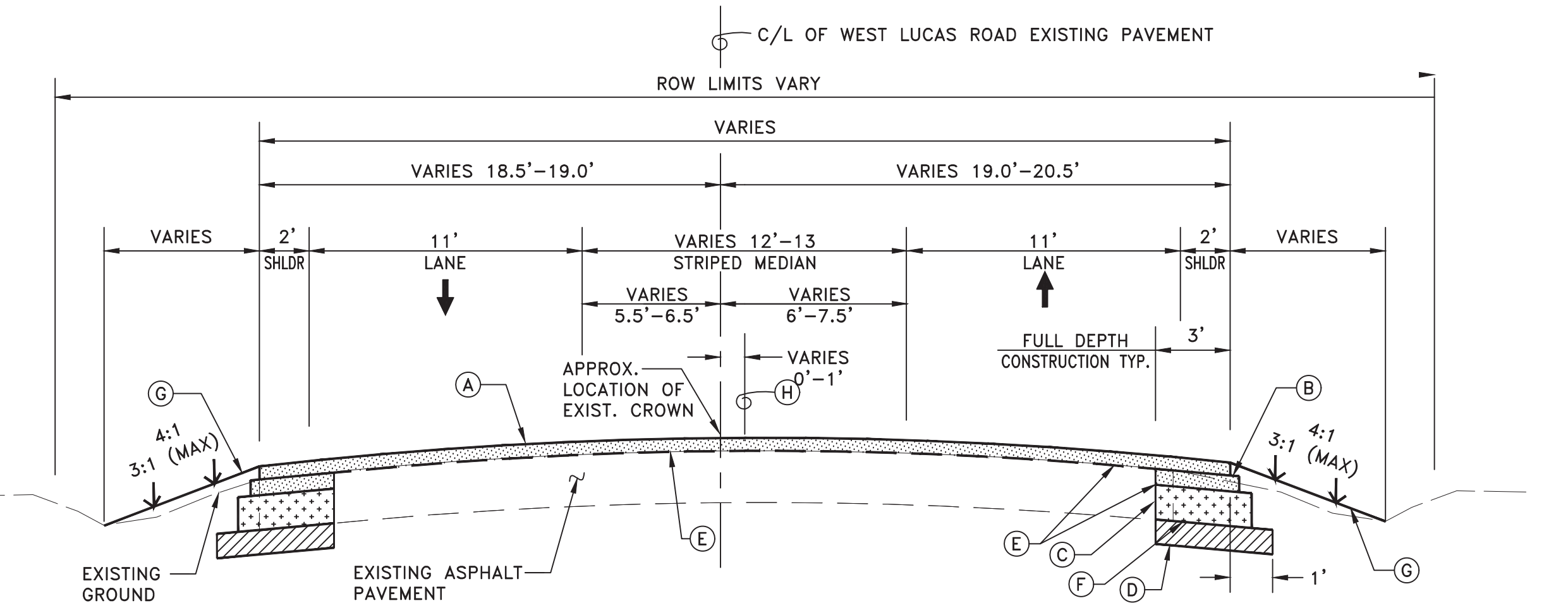
4 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 39+38.07 TO STA. 43+11.41  
STA. 47+17.34 TO STA. 49+29.73



2 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 29+35.01 TO STA. 38+25.54  
STA. 64+59.27 TO STA. 68+00.00



5 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 43+11.41 TO STA. 47+17.34



3 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 38+25.54 TO STA. 39+38.07  
STA. 49+90.25 TO STA. 51+24.72

TYPICAL SECTION NOTES:

- EXISTING ASPHALT SURFACES TO BE CLEAN AND FREE OF LOOSE DEBRIS AND DIRT PRIOR TO BEING OVERLAID WITH NEW ASPHALT.
- PAVEMENT SECTION WIDTH VARIES FROM STA. 26+50 (MATCH EXISTING WIDTH) TO STA. 27+00 (39' WIDTH). SEE PLAN VIEW.

TYPICAL SECTIONS LEGEND:

- (A) 1 1/2" TYPE 'D' HMAC SURFACE COURSE
- (B) 3" TYPE 'D' HMAC COURSE
- (C) 4" TYPE 'B' HMAC BINDER COURSE (2-2" COURSES)
- (D) 8" LIME TREATED SUBGRADE (6%) THOROUGHLY MIX AND COMPACTED TO 95% S.P.D.
- (E) TACK COAT (@ 0.05 GAL/S.Y.)
- (F) PRIME COAT (@ 0.30 GAL/S.Y.)
- (G) BLOCK SOD
- (H) CENTERLINE OF PROPOSED ROADWAY SECTION

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REVIEWED: \_\_\_\_\_ MRB  
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DATE: \_\_\_\_\_ APRIL 2017  
DWG. NAME: \_\_\_\_\_ 1623TYPSECTION



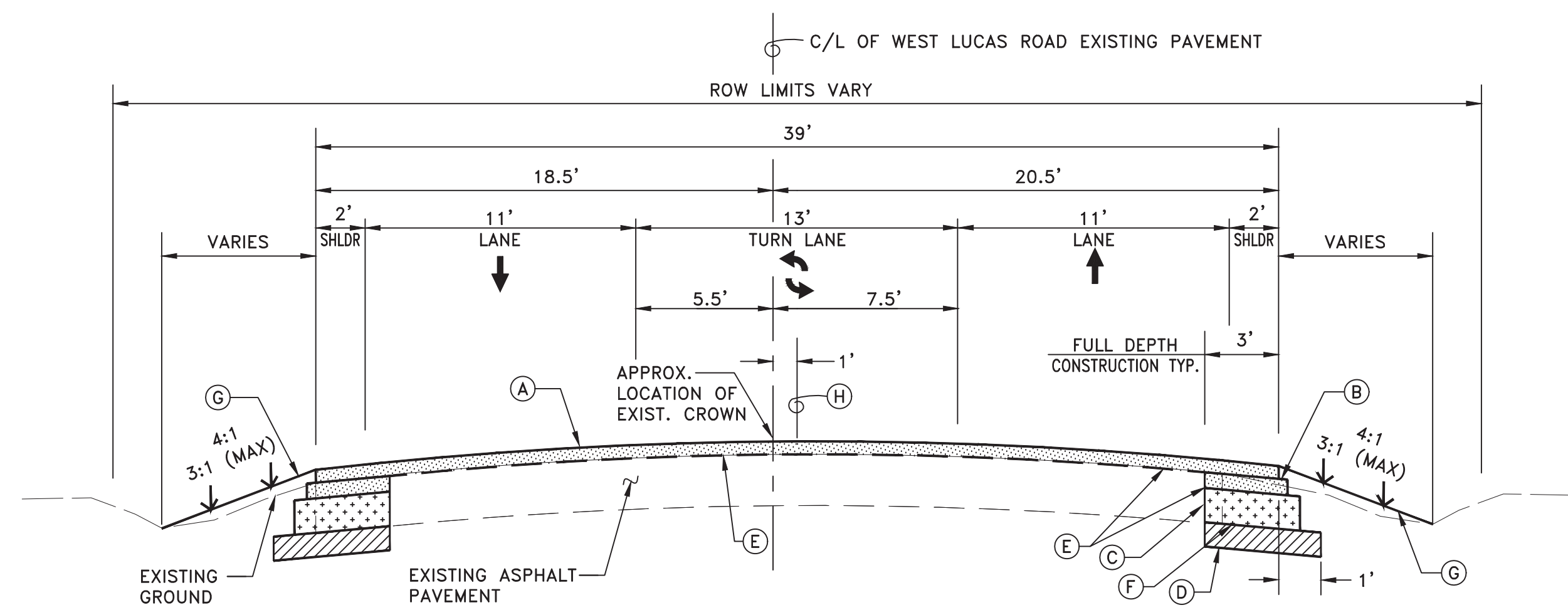
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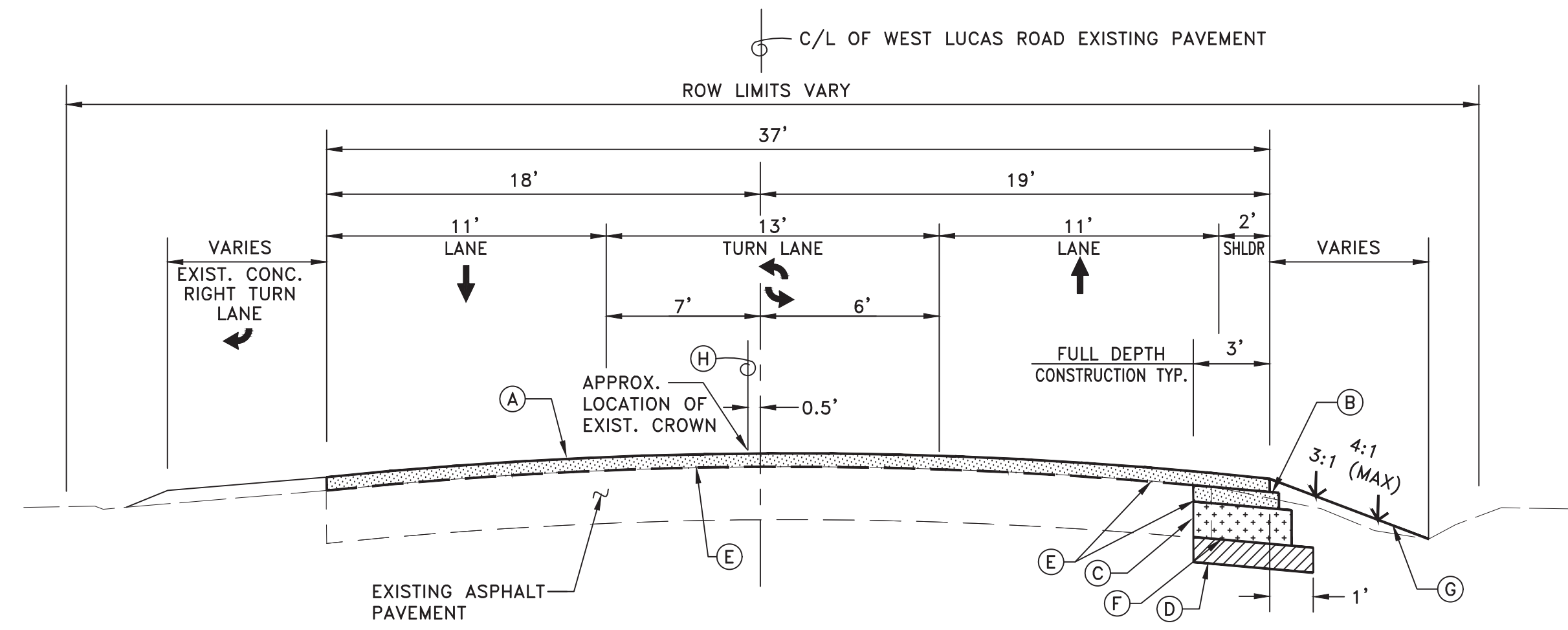
WIDENING AND OVERLAY PROJECT  
WEST LUCAS ROAD  
CONSTRUCTION DETAILS - SHEET 1 OF 4  
**CITY OF LUCAS**

SHEET NO. 3  
OF 51 SHEETS  
JOB NO. 13-1623

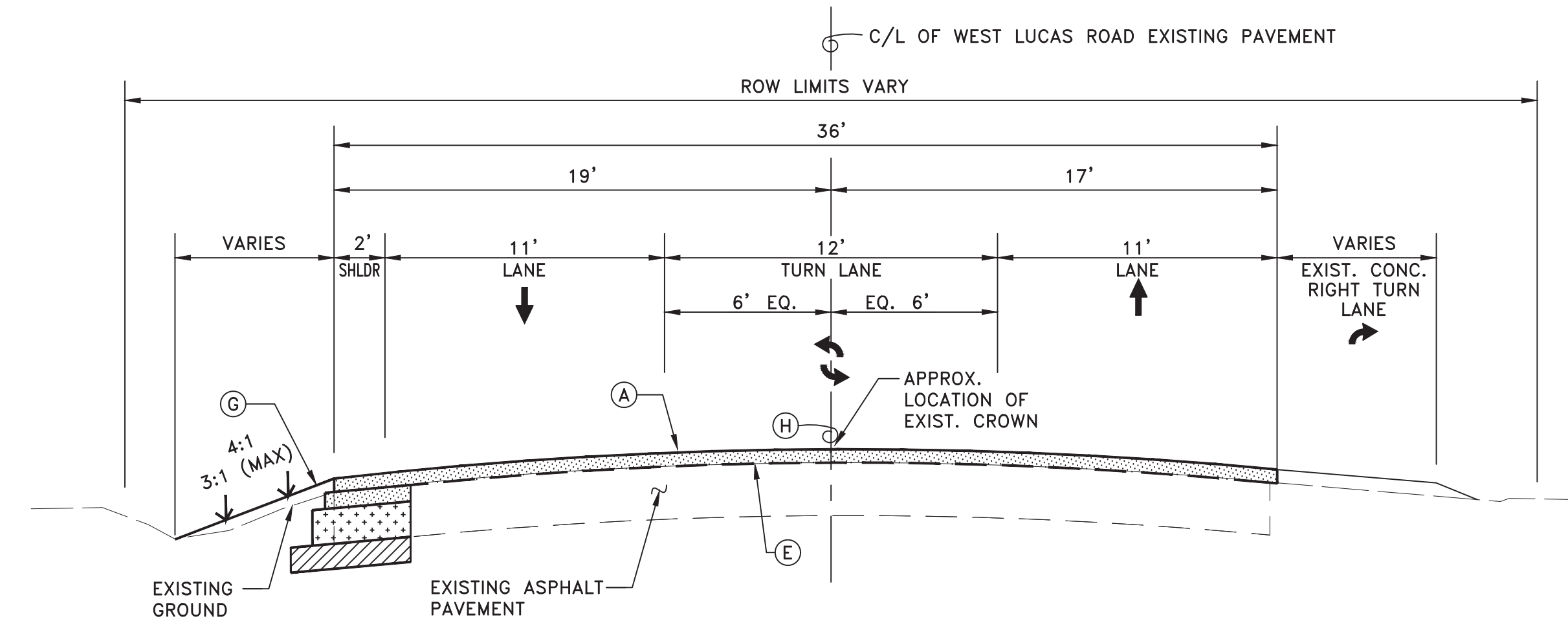




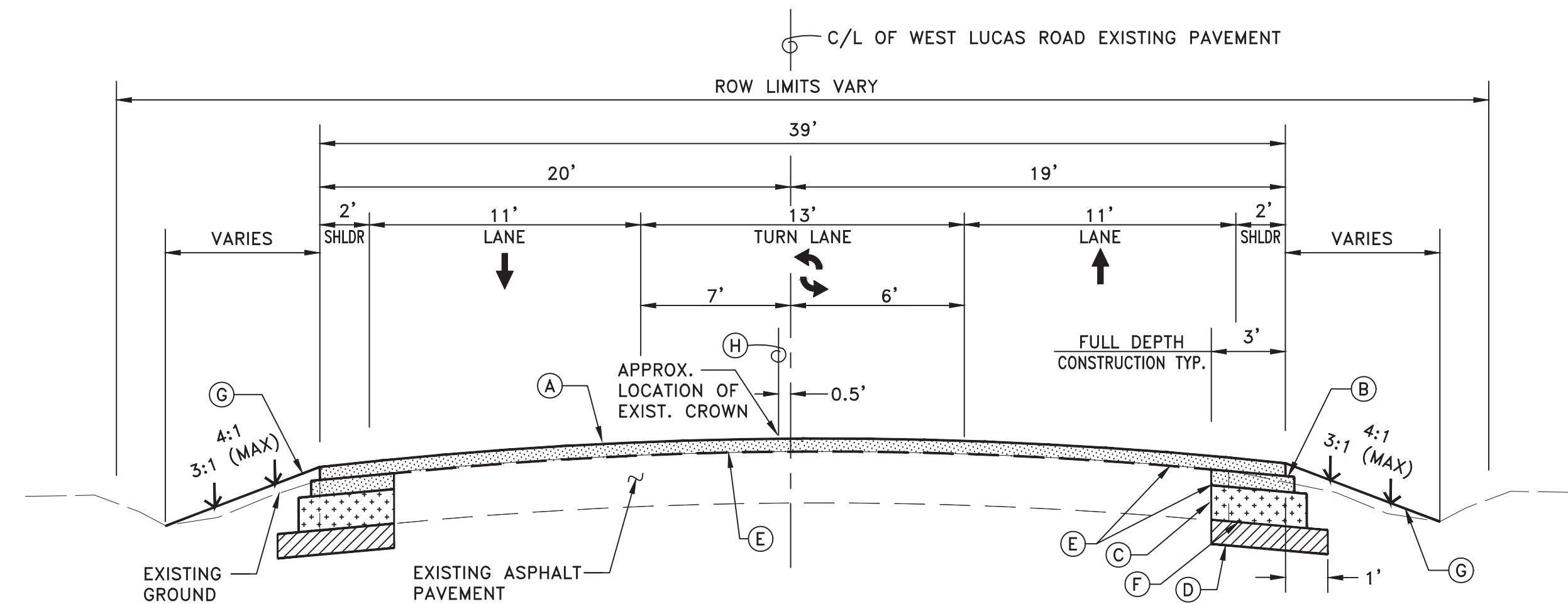
6 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 49+29.73 TO STA. 49+90.25



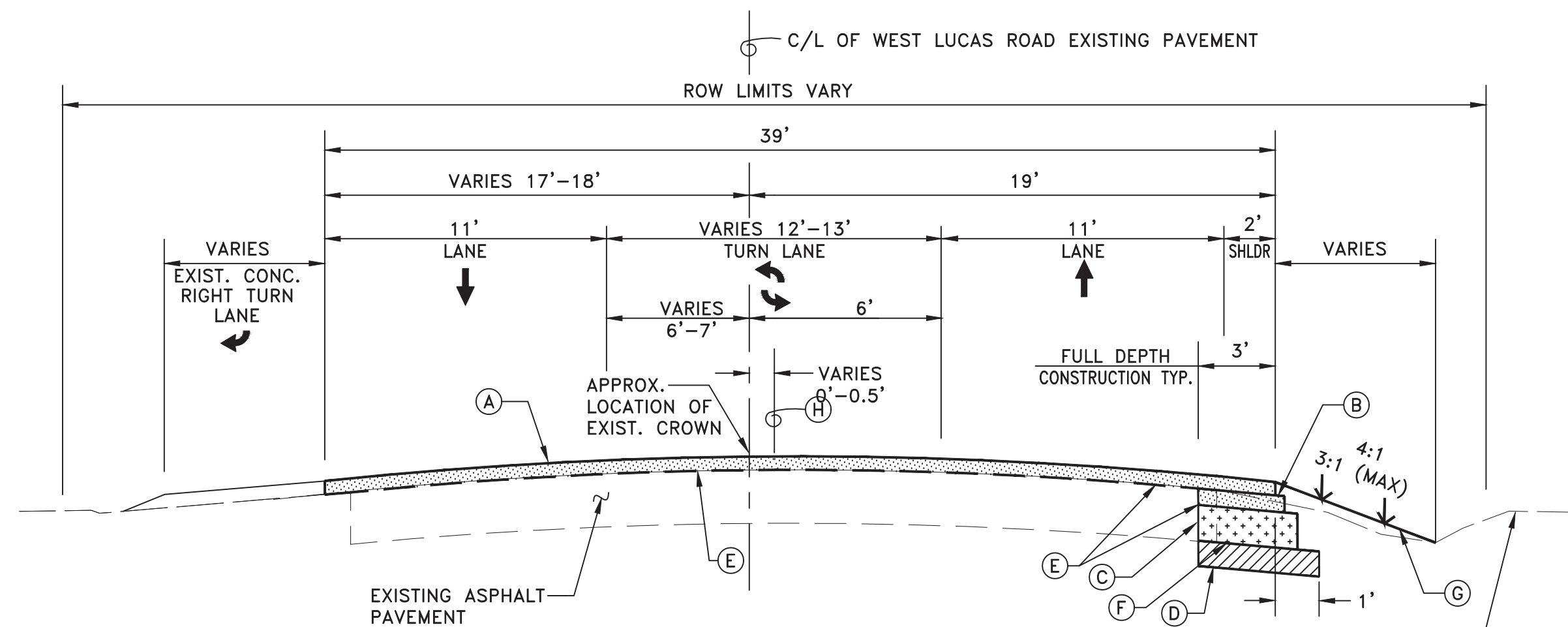
9 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 53+61.75 TO STA. 54+93.50



7 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 51+24.72 TO STA. 52+77.78



10 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 54+93.50 TO STA. 55+71.32  
STA. 56+98.57 TO STA. 57+52.60



8 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 52+77.78 TO STA. 53+61.75

TYPICAL SECTIONS LEGEND:

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- (E) TACK COAT (@ 0.05 GAL/S.Y.)
- (F) PRIME COAT (@ 0.30 GAL/S.Y.)
- (G) BLOCK SOD
- (H) CENTERLINE OF PROPOSED ROADWAY SECTION

TYPICAL SECTION NOTES:

1. EXISTING ASPHALT SURFACES TO BE CLEAN AND FREE OF LOOSE DEBRIS AND DIRT PRIOR TO BEING OVERLAID WITH NEW ASPHALT.

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DESIGN: \_\_\_\_\_ JFW  
REVIEWED: \_\_\_\_\_ MRB  
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DWG. NAME: \_\_\_\_\_ 1623TYPSECTION



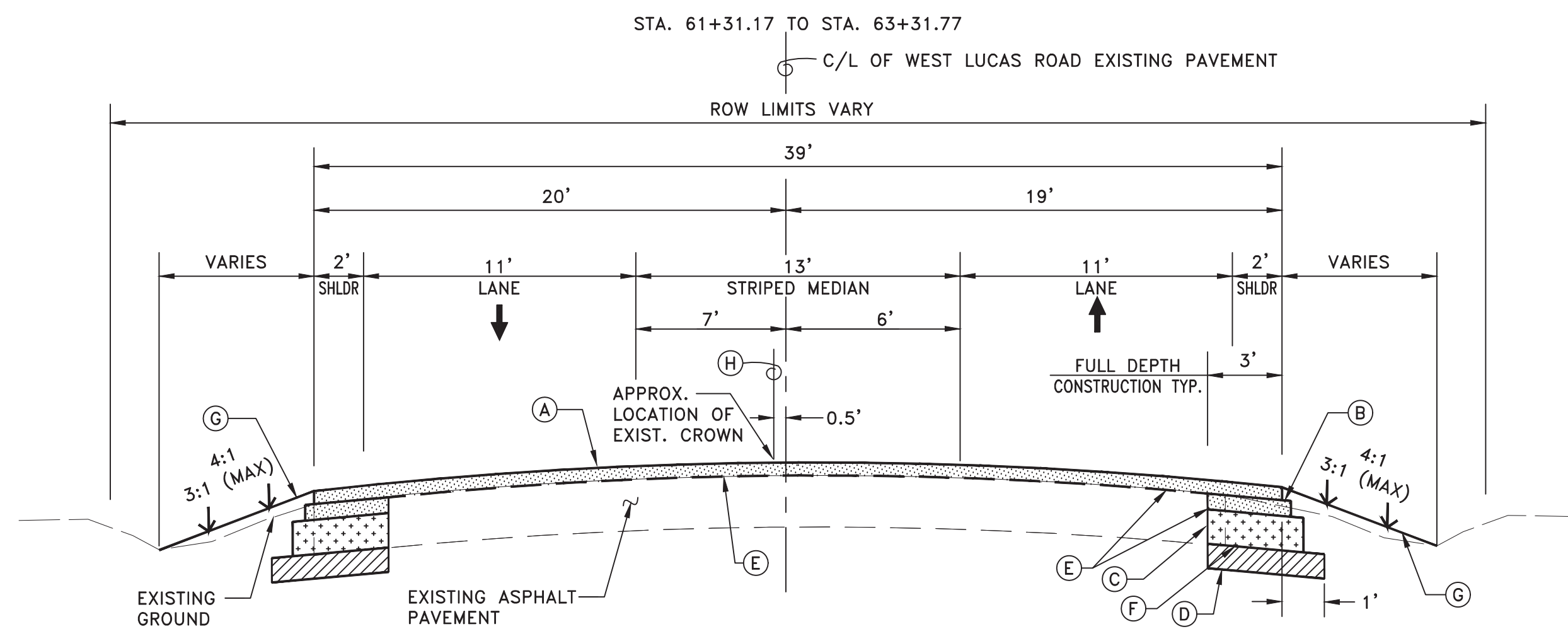
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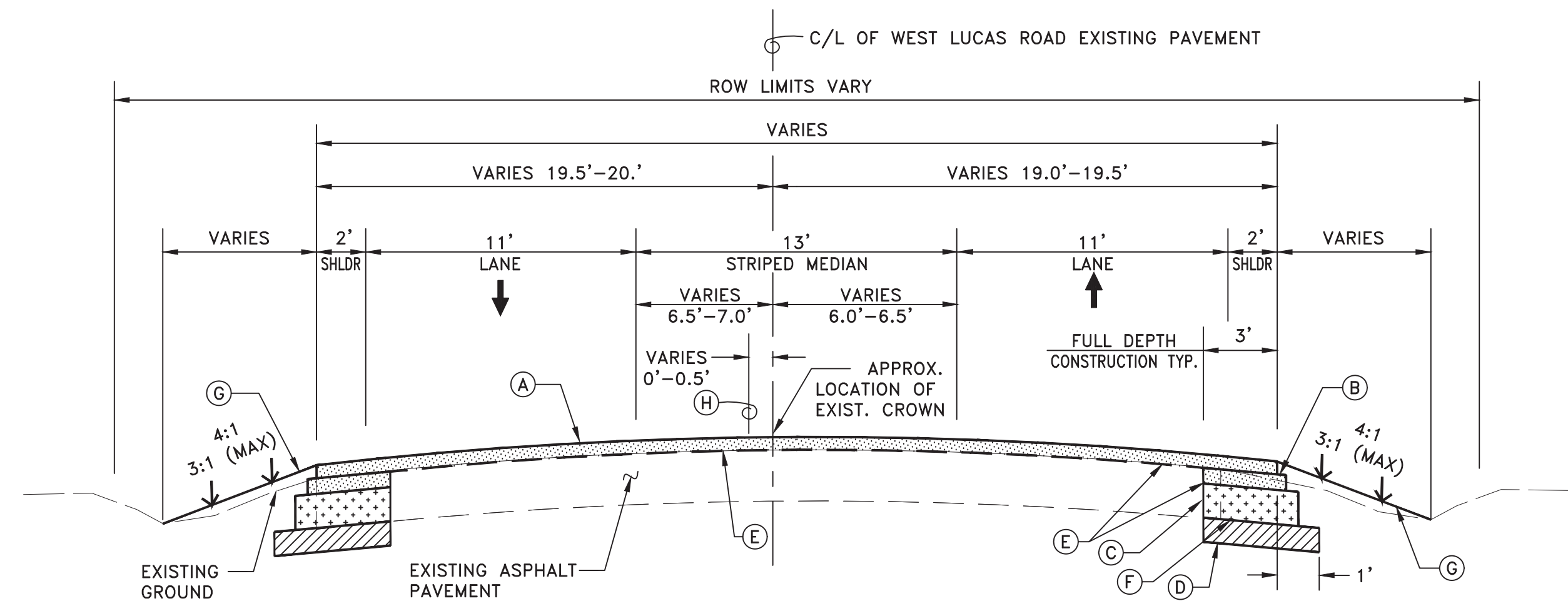
WIDENING AND OVERLAY PROJECT  
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CONSTRUCTION DETAILS - SHEET 2 OF 4  
**CITY OF LUCAS**

SHEET NO. 4  
OF 51 SHEETS  
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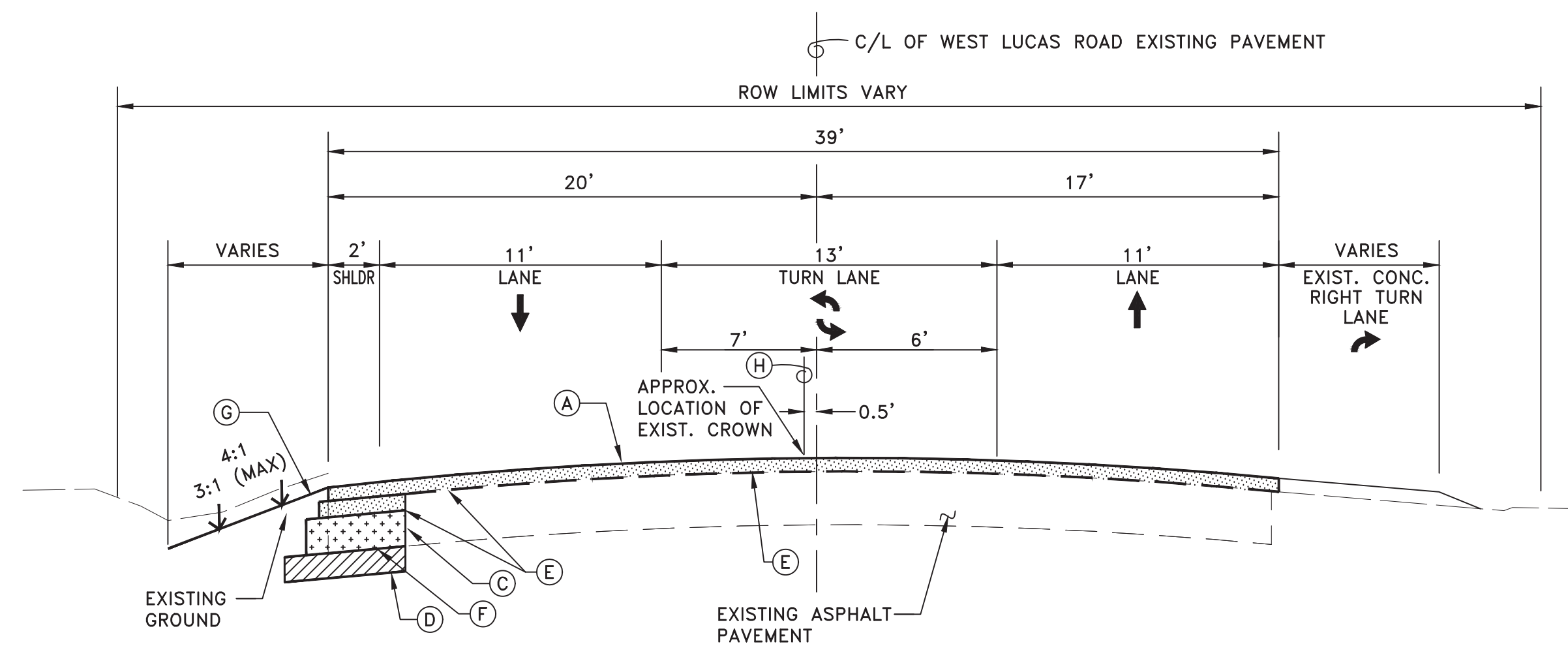




11 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 55+71.32 TO STA. 56+98.57



13 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 63+31.77 TO STA. 64+59.27



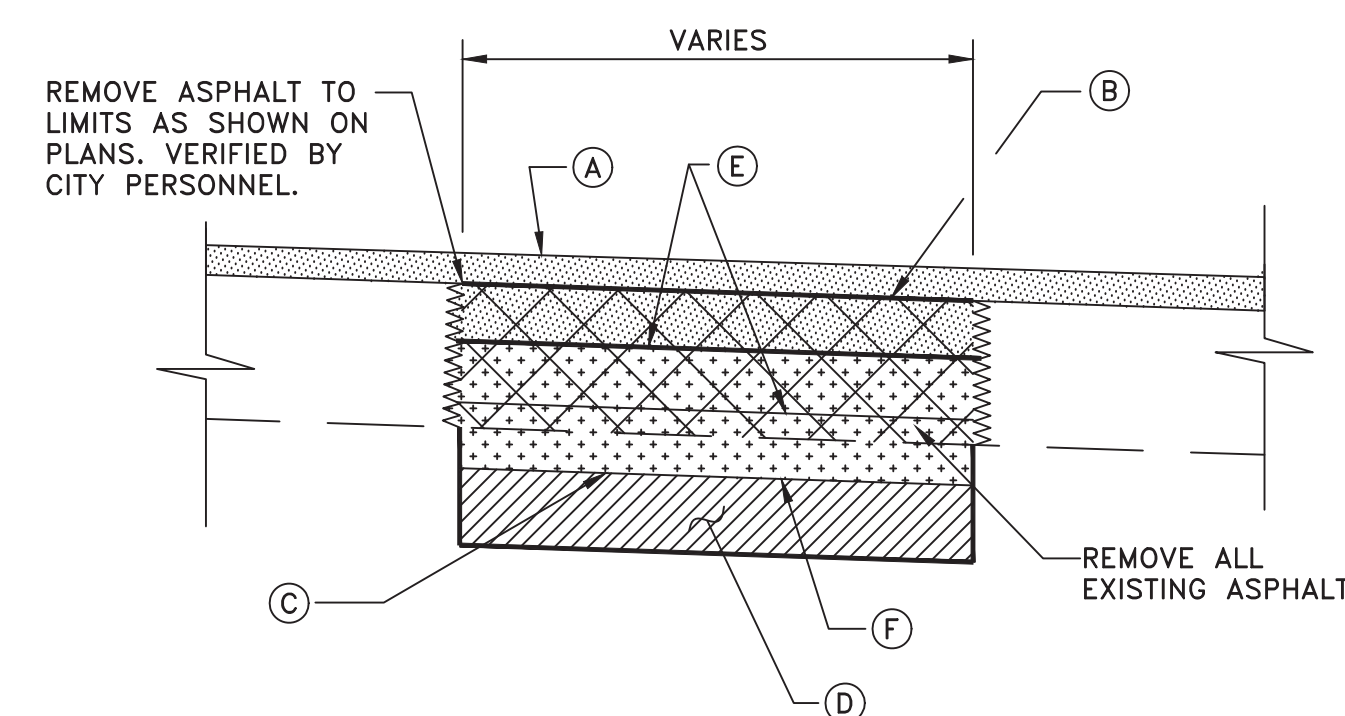
12 WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 57+52.60 TO STA. 61+31.77

TYPICAL SECTIONS LEGEND:

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- (H) CENTERLINE OF PROPOSED ROADWAY SECTION

TYPICAL SECTION NOTES:

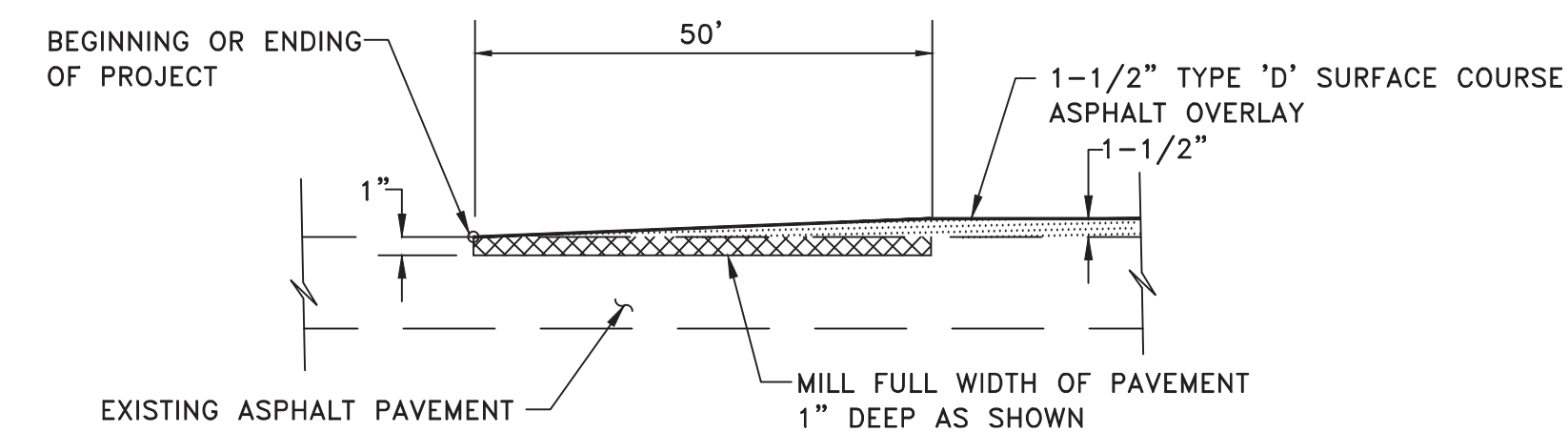
1. EXISTING ASPHALT SURFACES TO BE CLEAN AND FREE OF LOOSE DEBRIS AND DIRT PRIOR TO BEING OVERLAID WITH NEW ASPHALT.



14 FULL-DEPTH ASPHALT REPAIR  
NOT TO SCALE

FULL-DEPTH ASPHALT REPAIR NOTES:

1. FULL DEPTH ASPHALT REPAIR DETAIL TO BE UTILIZED IN AREAS AS NOTED ON THE PLANS AND IF ANY FAILURE AREAS ARE ENCOUNTERED. THESE AREAS SHALL BE VERIFIED AND MARKED IN THE FIELD BY CITY PERSONNEL. FULL DEPTH ASPHALT REPAIRS ARE TO BE PAID FOR BY THE SQUARE YARD AND SHALL INCLUDE ALL ITEMS AS REQUIRED BY THE DETAIL. NO ASPHALT REPAIR WORK IS TO BE DONE BY CONTRACTOR WITHOUT VERIFICATION AND CONFIRMATION BY CITY PERSONNEL.



15 OVERLAY TRANSITION DETAIL AT PROJECT LIMITS  
NOT TO SCALE

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BW2 Engineers, Inc.  
1919 S. SHILOH ROAD, SUITE 500  
GARLAND, TEXAS 75042  
(972) 864-8200  
RECORD DRAWINGS PREPARED ON:  
10/01/2018

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NO.	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
DESIGN: \_\_\_\_\_ JFW  
REVIEWED: \_\_\_\_\_ MRB  
SCALE: \_\_\_\_\_ NOT TO SCALE  
DATE: \_\_\_\_\_ APRIL 2017  
DWG. NAME: \_\_\_\_\_ 1623TYPSECTION



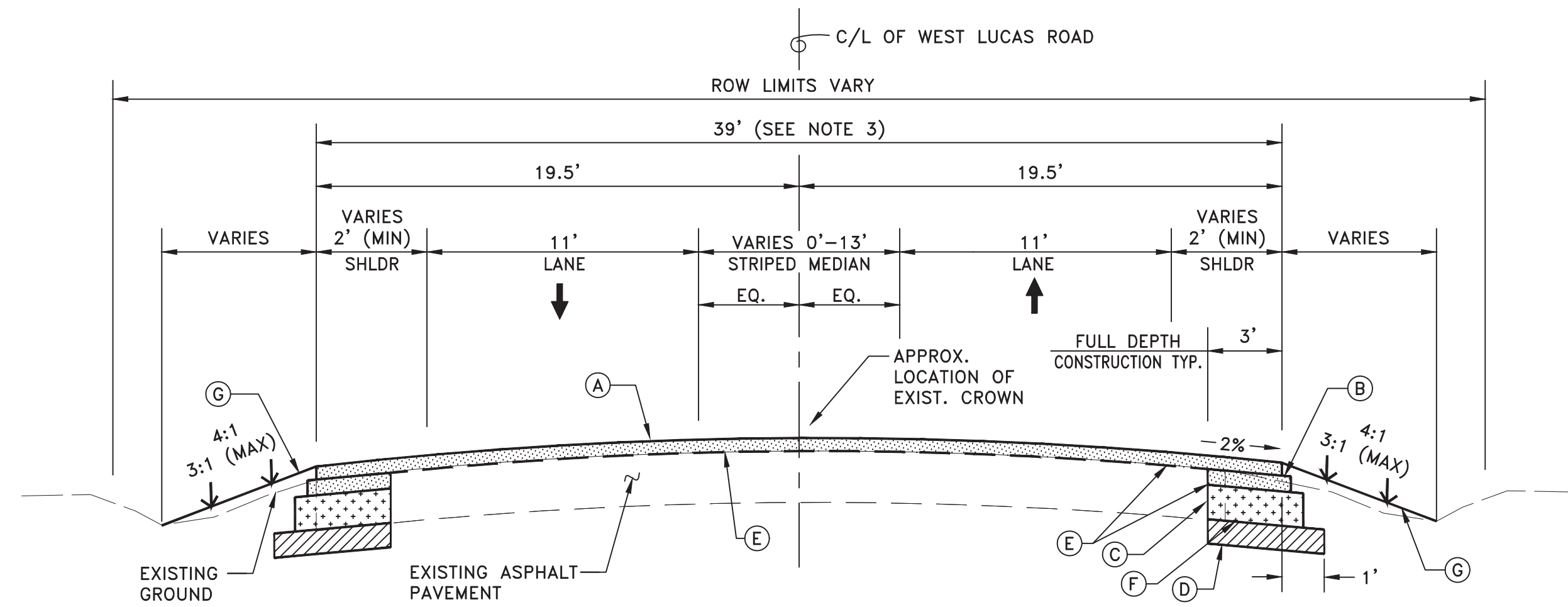
**BW2 ENGINEERS, INC.**  
1919 S. Shiloh Road  
Suite 500, L.B. 27  
Garland, Texas 75042  
(972) 864-8200 (T) (972) 864-8220 (F)  
Firm Registration No. F-5290

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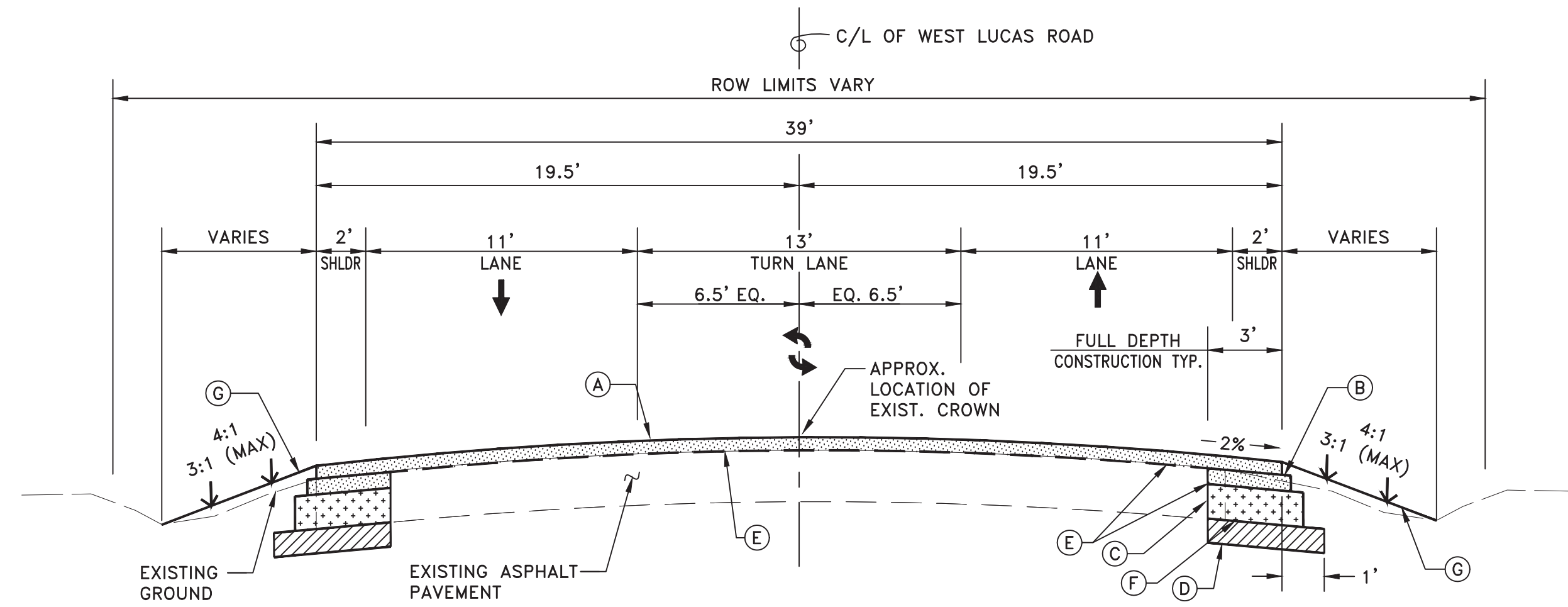
WIDENING AND OVERLAY PROJECT  
WEST LUCAS ROAD  
CONSTRUCTION DETAILS - SHEET 3 OF 4  
**CITY OF LUCAS**

SHEET NO. 5  
OF 51 SHEETS  
JOB NO. 13-1623





**A** WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 1+75.60 TO STA. 4+46.04



**B** WEST LUCAS ROAD TYPICAL SECTION  
NOT TO SCALE  
STA. 4+46.04 TO STA. 29+35.01

**TYPICAL SECTION NOTES:**

1. TYPICAL SECTIONS 'A' AND 'B' SHALL BE USED ONLY FOR THE ADD ALTERNATE.
2. EXISTING ASPHALT SURFACES TO BE CLEAN AND FREE OF LOOSE DEBRIS AND DIRT PRIOR TO BEING OVERLAID WITH NEW ASPHALT.
3. PAVEMENT SECTION WIDTH VARIES FROM STA. 1+75 (MATCH EXISTING WIDTH) TO STA. 3+00 (39' WIDTH). SEE ADD ALTERNATE PLAN VIEW.

**TYPICAL SECTIONS LEGEND:**

- (A) 1½" TYPE 'D' HMAC SURFACE COURSE
- (B) 3" TYPE 'D' HMAC COURSE
- (C) 4" TYPE 'B' HMAC BINDER COURSE (2-2" COURSES)
- (D) 8" LIME TREATED SUBGRADE (6% THOROUGHLY MIX AND COMPACTED TO 95% S.P.D.)
- (E) TACK COAT (@ 0.05 GAL/S.Y.)
- (F) PRIME COAT (@ 0.30 GAL/S.Y.)
- (G) BLOCK SOD
- (H) CENTERLINE OF PROPOSED ROADWAY SECTION

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GARLAND, TEXAS 75042  
(972) 864-8200  
RECORD DRAWINGS PREPARED ON:  
10/01/2018

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NO.	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
DESIGN: \_\_\_\_\_ JFW  
REVIEWED: \_\_\_\_\_ MRB  
SCALE: \_\_\_\_\_ NOT TO SCALE  
DATE: \_\_\_\_\_ APRIL 2017  
DWG. NAME: \_\_\_\_\_ 1623TYPSECTION



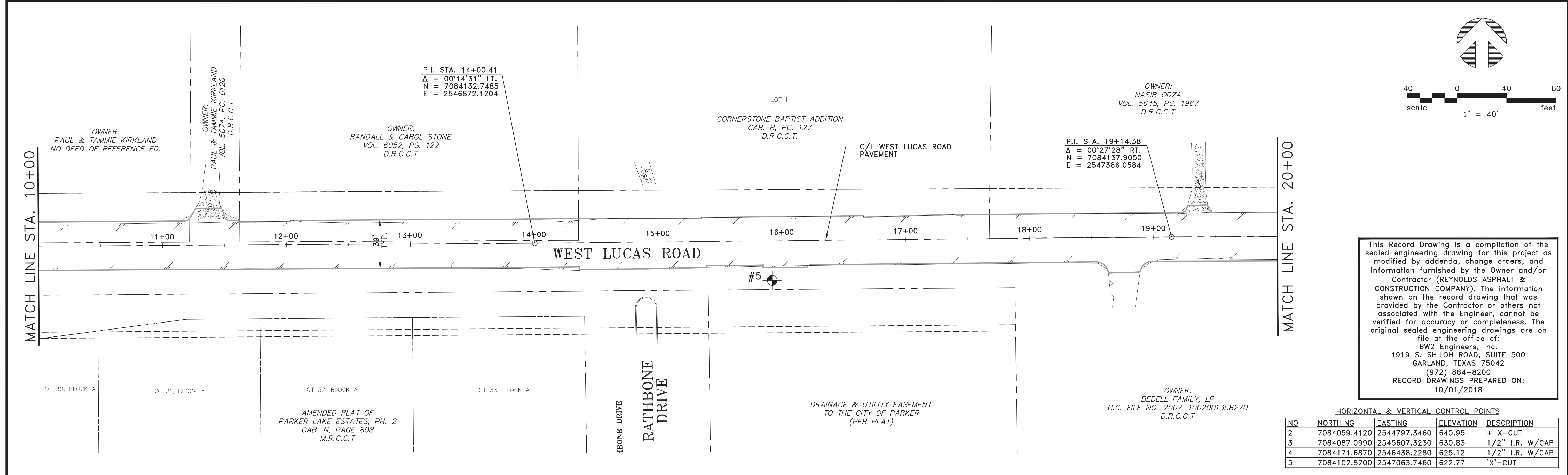
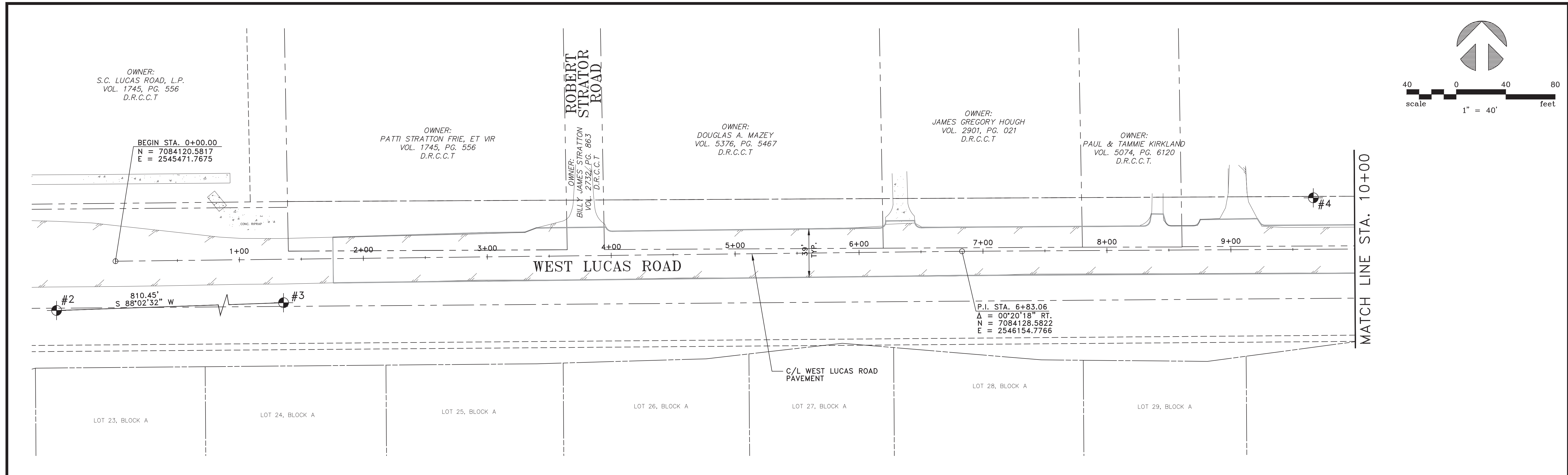
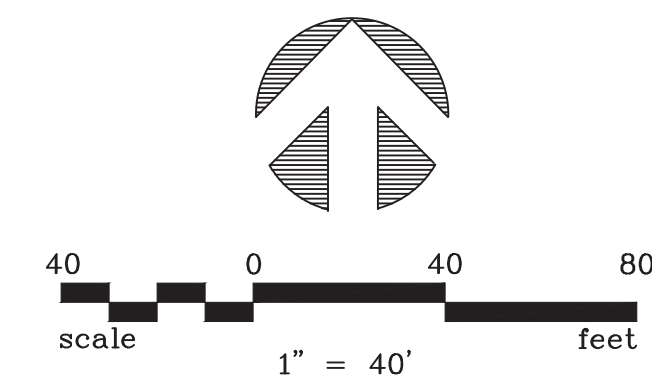
**BW2 ENGINEERS, INC.**  
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Suite 500, L.B. 27  
Garland, Texas 75042  
(972) 864-8200 (T) (972) 864-8220 (F)  
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WIDENING AND OVERLAY PROJECT  
WEST LUCAS ROAD  
CONSTRUCTION DETAILS - SHEET 4 OF 4  
**CITY OF LUCAS**

SHEET NO. 6  
OF 51 SHEETS  
JOB NO. 13-1623





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GARLAND, TEXAS 75042  
(972) 864-8200  
RECORD DRAWINGS PREPARED ON:  
10/01/2018

HORIZONTAL & VERTICAL CONTROL POINTS				
NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
2	7084059.4120	2544797.3460	640.95	+ X-CUT
3	7084087.0990	2545607.3230	630.83	1/2" I.R. W/CAP
4	7084171.6870	2546438.2280	625.12	1/2" I.R. W/CAP
5	7084102.8200	2547063.7460	622.77	'X'-CUT

NO.	DATE	REVISION	REVIEWED
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DRAWN: \_\_\_\_\_ BW2  
DESIGN: \_\_\_\_\_ JFW  
REVIEWED: \_\_\_\_\_ MRB  
SCALE: \_\_\_\_\_ 1" = 20'  
DATE: \_\_\_\_\_ APRIL 2017  
DWG. NAME: \_\_\_\_\_ 1623DIM-CTRL01



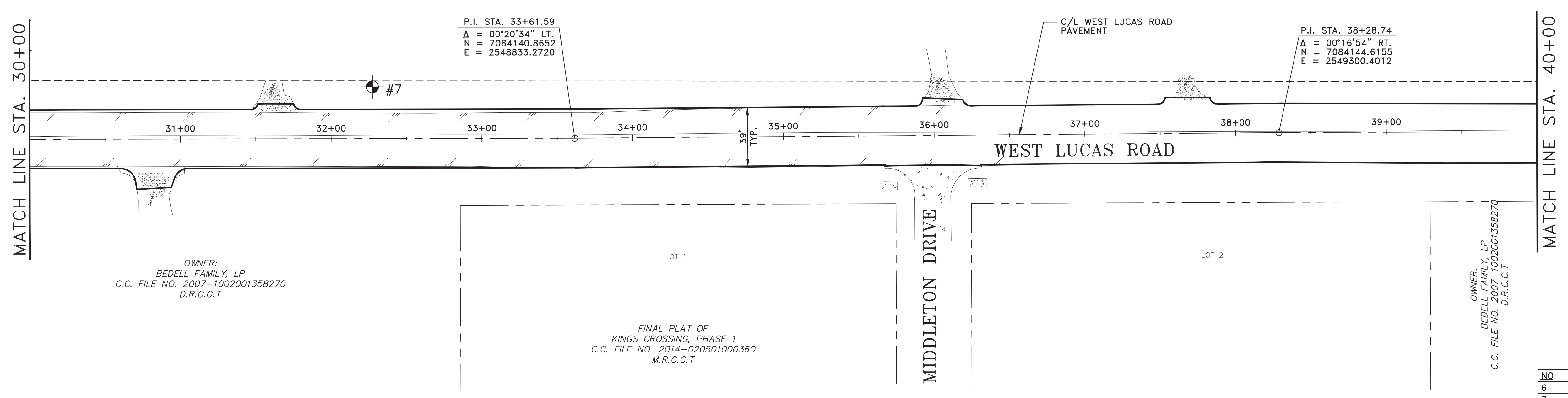
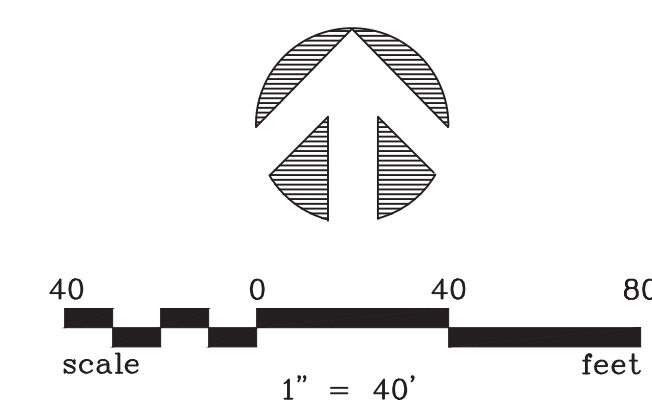
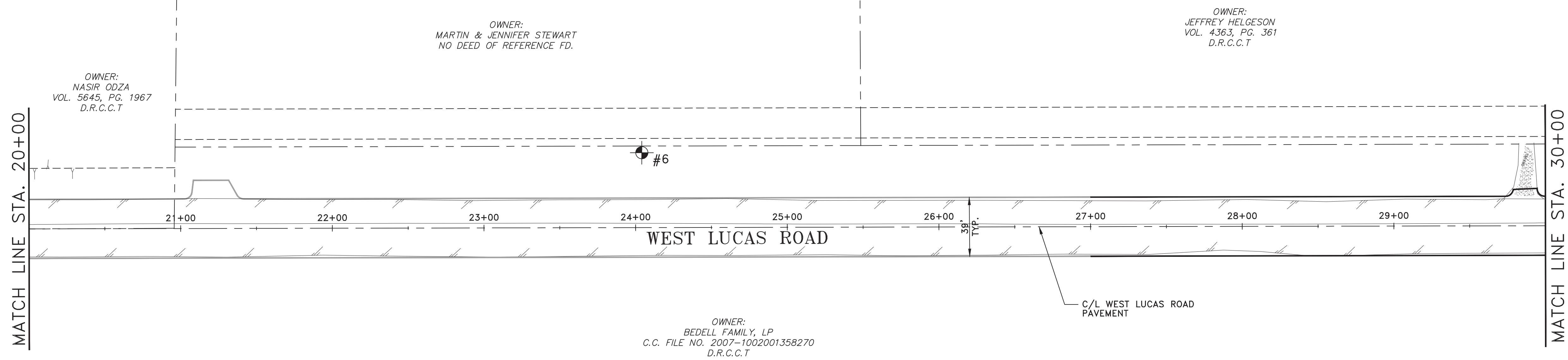
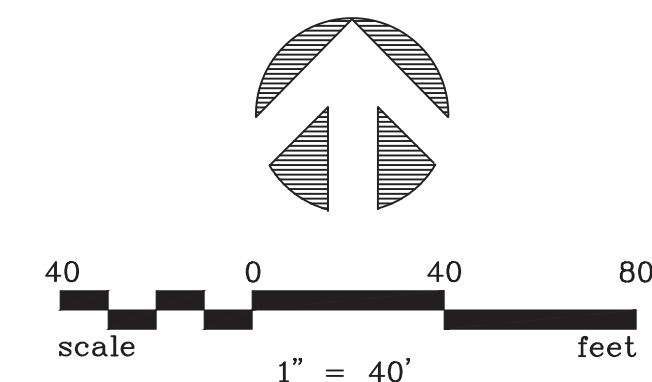
**BW2 ENGINEERS, INC.**  
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Suite 500, L.B. 27  
Garland, Texas 75042  
(972) 864-8200 (T) (972) 864-8220 (F)  
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**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
**DIMENSIONAL CONTROL PLAN - SHEET 1 OF 4**  
**CITY OF LUCAS**

SHEET NO. 7  
OF 51 SHEETS  
JOB NO. 13-1623





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 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

HORIZONTAL & VERTICAL CONTROL POINTS				
NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
6	7084188.3140	2547875.7800	615.94	1/2" I.R. W/CAP
7	7084174.9800	2548699.0720	612.99	1/2" I.R. W/CAP

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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623DIM-CTRL02



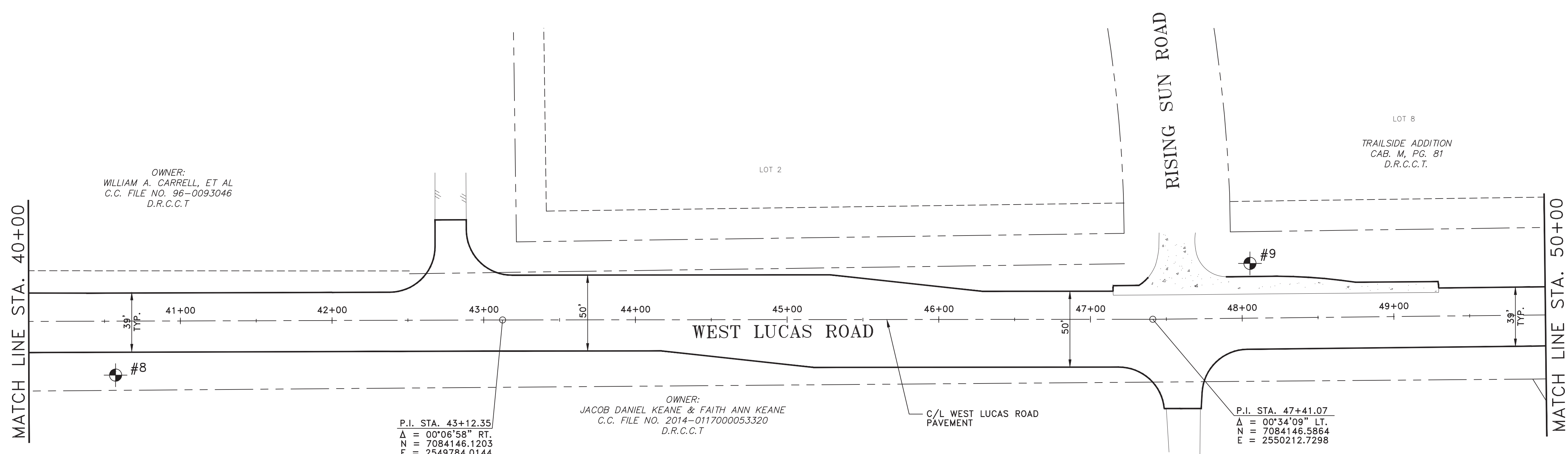
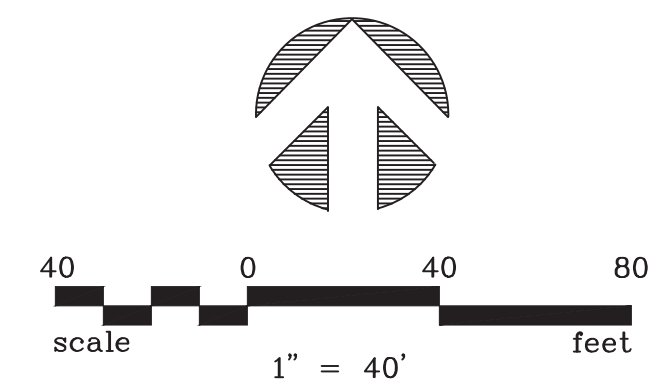
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
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**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
 DIMENSIONAL CONTROL PLAN - SHEET 2 OF 4  
**CITY OF LUCAS**

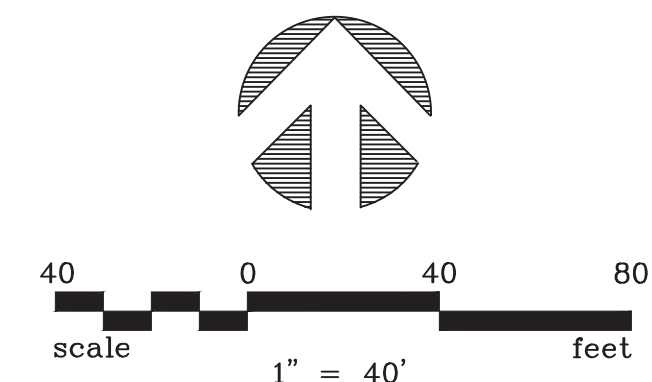
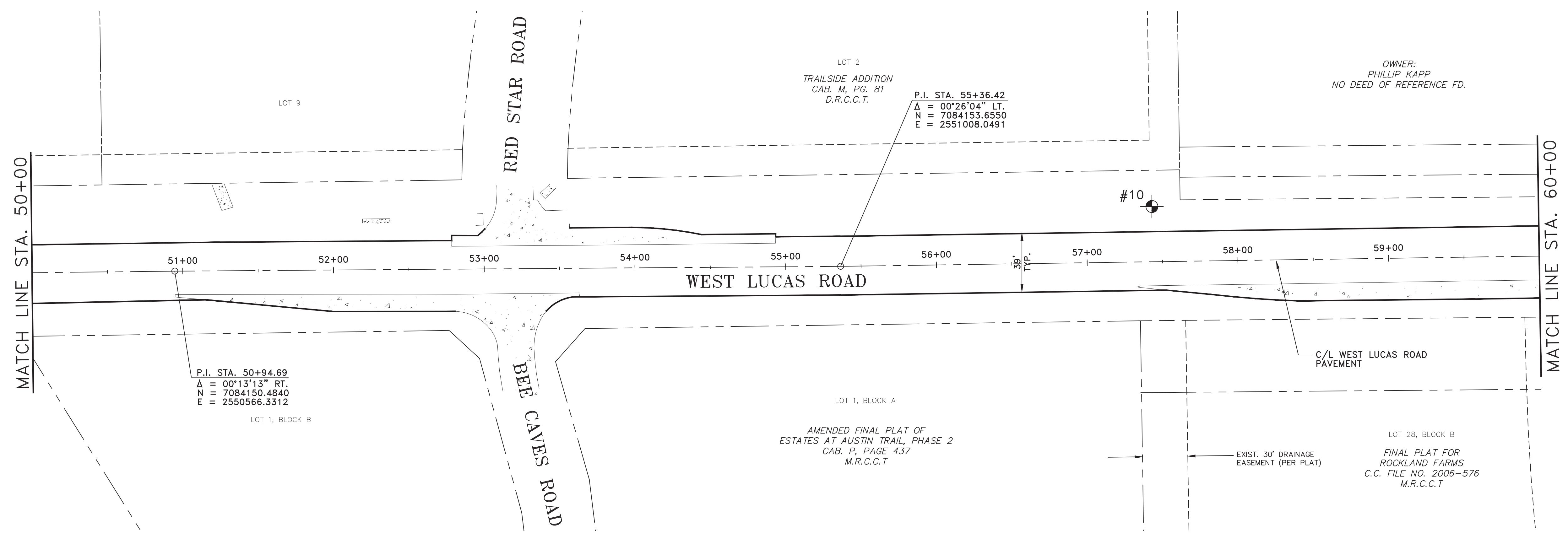
SHEET NO. 8  
 OF 51 SHEETS  
 JOB NO. 13-1623





HORIZONTAL & VERTICAL CONTROL POINTS

NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
8	7084109.7360	2549528.9240	619.46	1/2" I.R. W/CAP
9	7084183.3680	2550276.7880	622.34	1/2" I.R. W/CAP
10	7084193.3750	2551214.5550	618.94	1/2" I.R. W/CAP



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 10/01/2018

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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 40'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623DIM-CTRL03



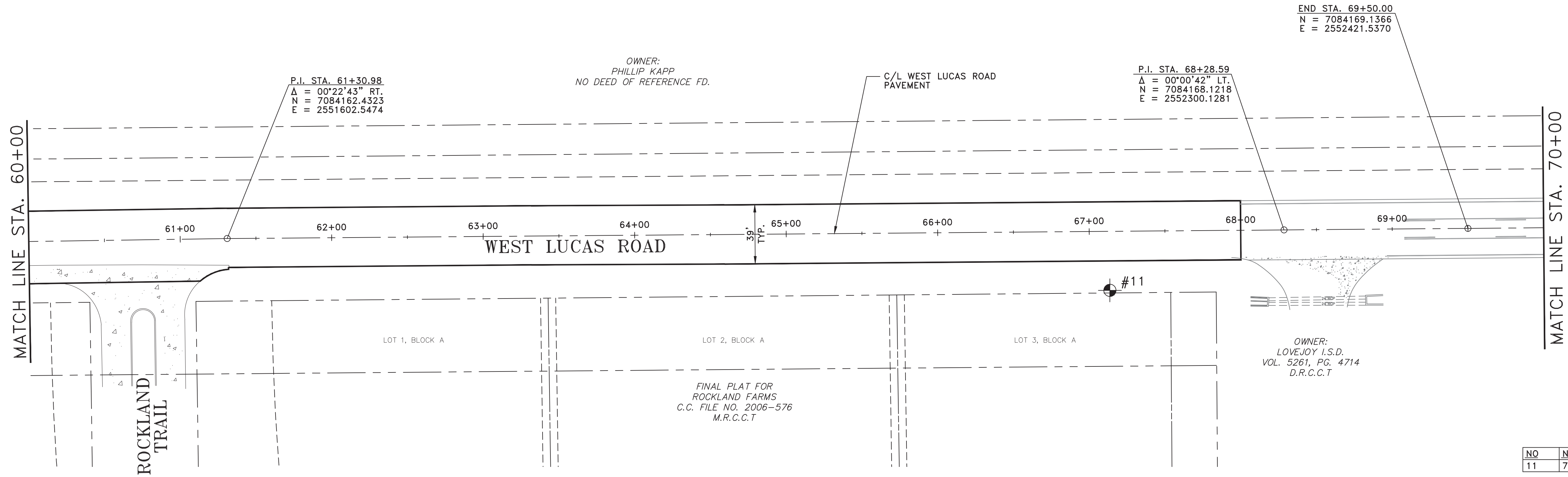
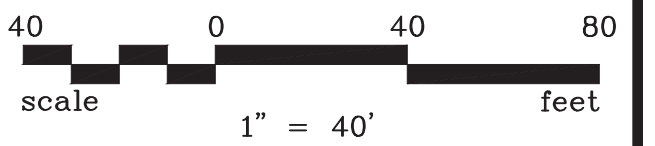
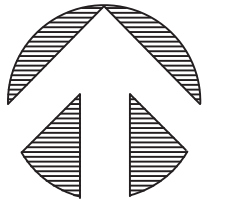
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
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 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
 DIMENSIONAL CONTROL PLAN - SHEET 3 OF 4  
**CITY OF LUCAS**

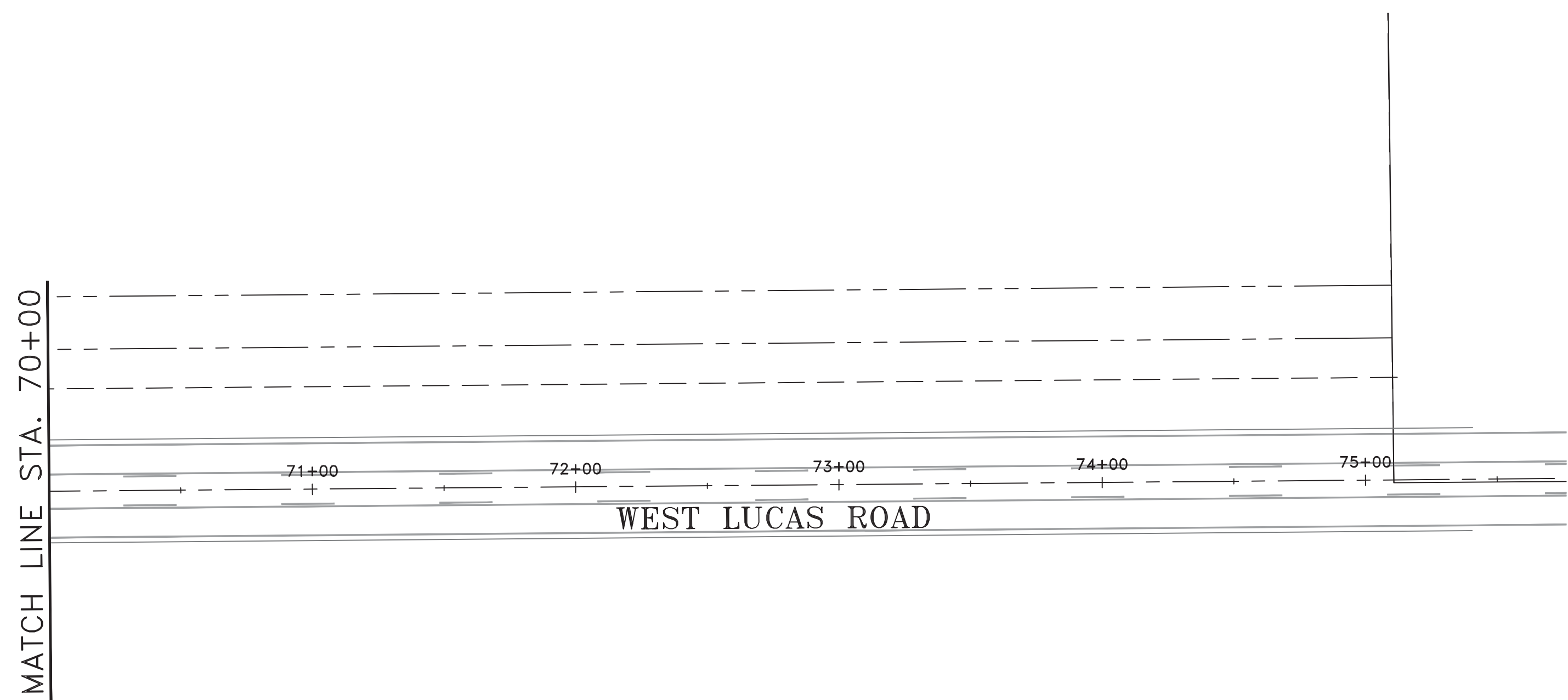
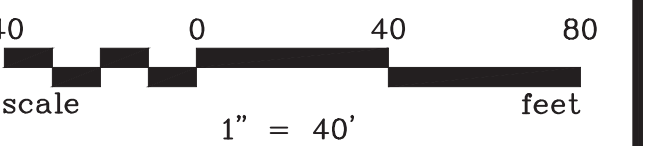
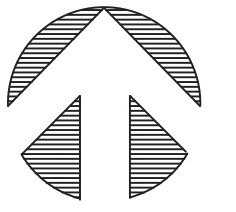
SHEET NO. 9  
 OF 51 SHEETS  
 JOB NO. 13-1623





HORIZONTAL & VERTICAL CONTROL POINTS

NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
11	7084128.2820	2552185.2050	619.30	1/2" I.R. W/CAP



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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 40'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623DIM-CTRL04



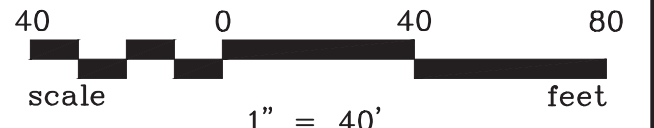
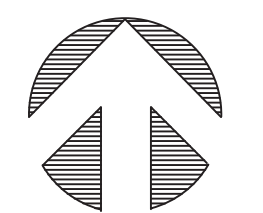
**BW2 ENGINEERS, INC.**  
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WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 DIMENSIONAL CONTROL PLAN - SHEET 4 OF 4  
**CITY OF LUCAS**

SHEET NO. 10  
 OF 51 SHEETS  
 JOB NO. 13-1623





OWNER:  
S.C. LUCAS ROAD, L.P.  
VOL. 1745, PG. 556  
D.R.C.C.T

OWNER:  
PATTI STRATTON FRIE, ET VIR  
VOL. 1745, PG. 556  
D.R.C.C.T

OWNER:  
BILLY JAMES STRATTON  
VOL. 2732, PG. 863  
D.R.C.C.T

OWNER:  
DOUGLAS A. MAZEY  
VOL. 5376, PG. 5467  
D.R.C.C.T

OWNER:  
JAMES GREGORY HOUGH  
VOL. 2901, PG. 021  
D.R.C.C.T

OWNER:  
PAUL & TAMMIE KIRKLAND  
VOL. 5074, PG. 6120  
D.R.C.C.T

OWNER:  
PAUL & TAMMIE KIRKLAND  
NO DEED OF REFERENCE FD.

BEGIN STA. 0+00.00

INSTALL 37 L.F.  
OF SILT FENCE.  
(ADD ALT.)

INSTALL 40 L.F.  
OF SILT FENCE.  
(ADD ALT.)

INSTALL 40 L.F.  
OF SILT FENCE.  
(ADD ALT.)

INSTALL 35 L.F.  
OF SILT FENCE.  
(ADD ALT.)

WEST LUCAS ROAD

P.I. STA. 6+83.06

MATCH LINE STA. 10+00

**LEGEND:**

- FLOW DIRECTION
- ROCK BERM
- SILT FENCE

- NOTES:**
1. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL EROSION CONTROL MEASURES REQUIRED UNTIL THE CONSTRUCTION IS COMPLETE, (SEE GENERAL NOTES).
  2. AS PART OF THE BID ITEM 'ADD ALTERNATE EROSION CONTROL', THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL EROSION CONTROL RUNOFF OF SILTATION FROM THE ADD ALTERNATE PROJECT LIMITS, (0+00 TO 26+00).
  3. 'ADD ALTERNATE EROSION CONTROL' SHALL FOLLOW THE SAME REGULATIONS AND GUIDELINES AS 'EROSION CONTROL'. (SEE NOTE 1).

LOT 23, BLOCK A

LOT 24, BLOCK A

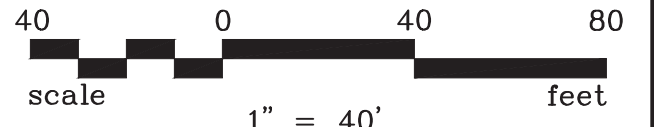
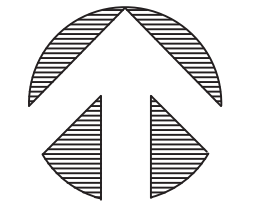
LOT 25, BLOCK A

LOT 26, BLOCK A

LOT 27, BLOCK A

LOT 28, BLOCK A

LOT 29, BLOCK A



OWNER:  
PAUL & TAMMIE KIRKLAND  
NO DEED OF REFERENCE FD.

OWNER:  
PAUL & TAMMIE KIRKLAND  
VOL. 5074, PG. 6120  
D.R.C.C.T

OWNER:  
RANDALL & CAROL STONE  
VOL. 6052, PG. 122  
D.R.C.C.T

CORNERSTONE BAPTIST ADDITION  
CAB. R. PG. 127  
D.R.C.C.T

OWNER:  
NASIR ODZA  
VOL. 5645, PG. 1967  
D.R.C.C.T

INSTALL 38 L.F.  
OF SILT FENCE.  
(ADD ALT.)

INSTALL 15 L.F.  
OF SILT FENCE.  
(ADD ALT.)

INSTALL 30 L.F.  
OF SILT FENCE.  
(ADD ALT.)

INSTALL 20 L.F.  
OF ROCK BERM  
(ADD ALT.)

MATCH LINE STA. 10+00

P.I. STA. 14+00.41

P.I. STA. 19+14.38

MATCH LINE STA. 20+00

WEST LUCAS ROAD

INSTALL 40 L.F.  
OF SILT FENCE.  
(ADD ALT.)

INSTALL 25 L.F.  
OF ROCK BERM  
(ADD ALT.)

LOT 30, BLOCK A

LOT 31, BLOCK A

LOT 32, BLOCK A

LOT 33, BLOCK A

AMENDED PLAT OF  
PARKER LAKE ESTATES, PH. 2  
CAB. N, PAGE 808  
M.R.C.C.T

RATHBONE  
FRIVE

DRAINAGE & UTILITY EASEMENT  
TO THE CITY OF PARKER  
(PER PLAT)

OWNER:  
BEDELL FAMILY, LP  
C.C. FILE NO. 2007-1002001358270  
D.R.C.C.T

**!! CAUTION !!**

THERE ARE EXISTING AND/OR PROPOSED UTILITIES IN PROJECT AREA. UTILITY INFORMATION SHOWN ON PLANS REPRESENTS APPROXIMATE LOCATIONS OF EXISTING UTILITIES AND IS NOT NECESSARILY ALL-INCLUSIVE. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXACT LOCATIONS OF ALL EXISTING UTILITIES AND SHALL BE REQUIRED TO PROTECT UTILITIES TO AVOID DAMAGE.

**PRIOR TO ANY EXCAVATION, CONTRACTOR SHALL CONTACT DIG-TESS, TEXAS ONE CALL, LONE STAR NOTIFICATION AND OTHERS AS REQUIRED TO LOCATE EXISTING UTILITIES.**

CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE 48 HOURS PRIOR TO CONSTRUCTION.

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10/01/2018

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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623ERO-CTRL01



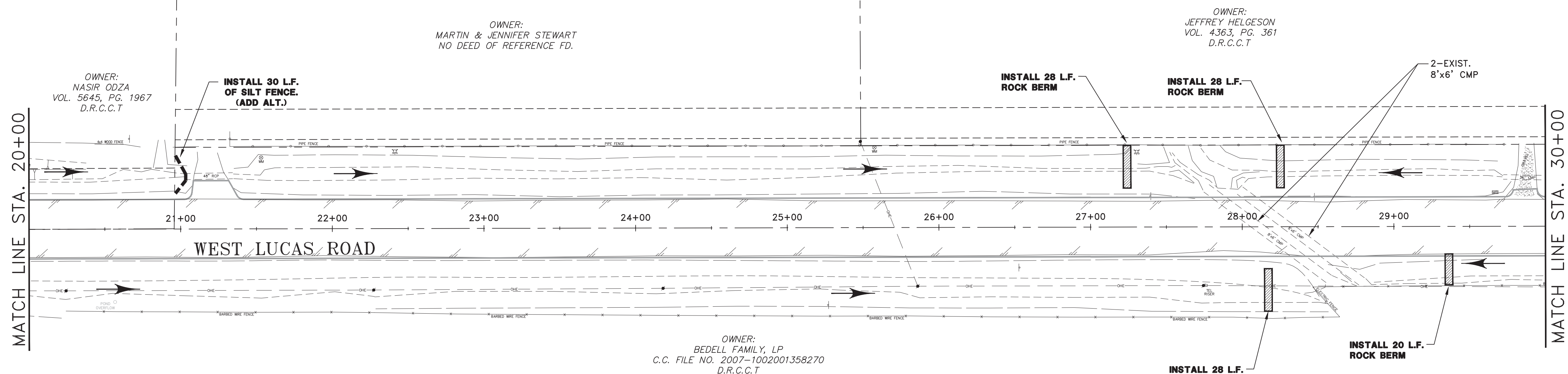
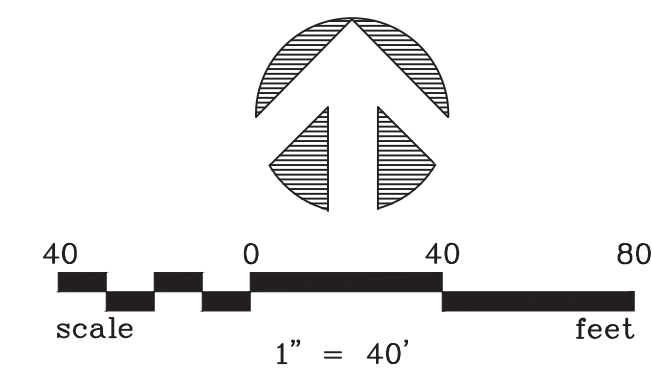
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

THE SEAL THAT ORIGINALLY APPEARED ON THIS DOCUMENT WAS AUTHORIZED BY JAMES F. WALDBAUER TEXAS P.E. 65670 ON 4/10/17 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION OF THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT.

**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 EROSION CONTROL PLAN - SHEET 1 of 4  
 CITY OF LUCAS**

SHEET NO. 11  
 OF 51 SHEETS  
 JOB NO. 13-1623

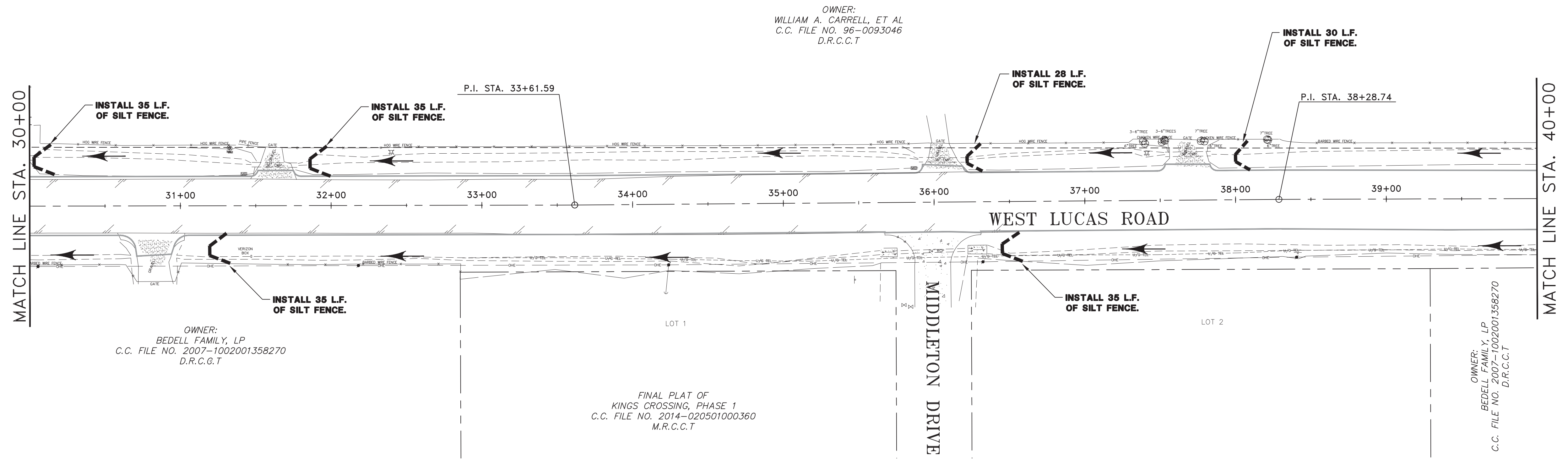
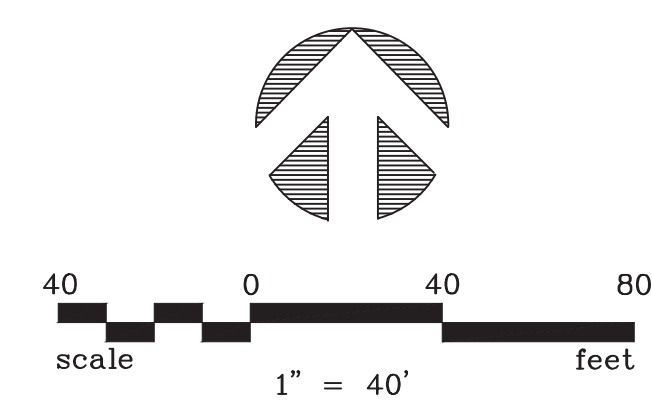




**LEGEND:**

- FLOW DIRECTION
- ROCK BERM
- SILT FENCE

- NOTES:**
1. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL EROSION CONTROL MEASURES REQUIRED UNTIL THE CONSTRUCTION IS COMPLETE, (SEE GENERAL NOTES).
  2. AS PART OF THE BID ITEM 'ADD ALTERNATE EROSION CONTROL', THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL EROSION CONTROL RUNOFF OF SILTATION FROM THE ADD ALTERNATE PROJECT LIMITS, (0+00 TO 26+00).
  3. 'ADD ALTERNATE EROSION CONTROL' SHALL FOLLOW THE SAME REGULATIONS AND GUIDELINES AS 'EROSION CONTROL', (SEE NOTE 1).



**!! CAUTION !!**

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**PRIOR TO ANY EXCAVATION, CONTRACTOR SHALL CONTACT DIG-TESS, TEXAS ONE CALL, LONE STAR NOTIFICATION AND OTHERS AS REQUIRED TO LOCATE EXISTING UTILITIES.**

CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE 48 HOURS PRIOR TO CONSTRUCTION.

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BW2 Engineers, Inc.  
 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

NO.	DATE	REVISION	REVIEWED
6			
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DRAWN:                      BW2  
 DESIGN:                     JFW  
 REVIEWED:                   MRB  
 SCALE:                      1" = 20'  
 DATE:                        APRIL 2017  
 DWG. NAME:                1623ERO-CTRL02



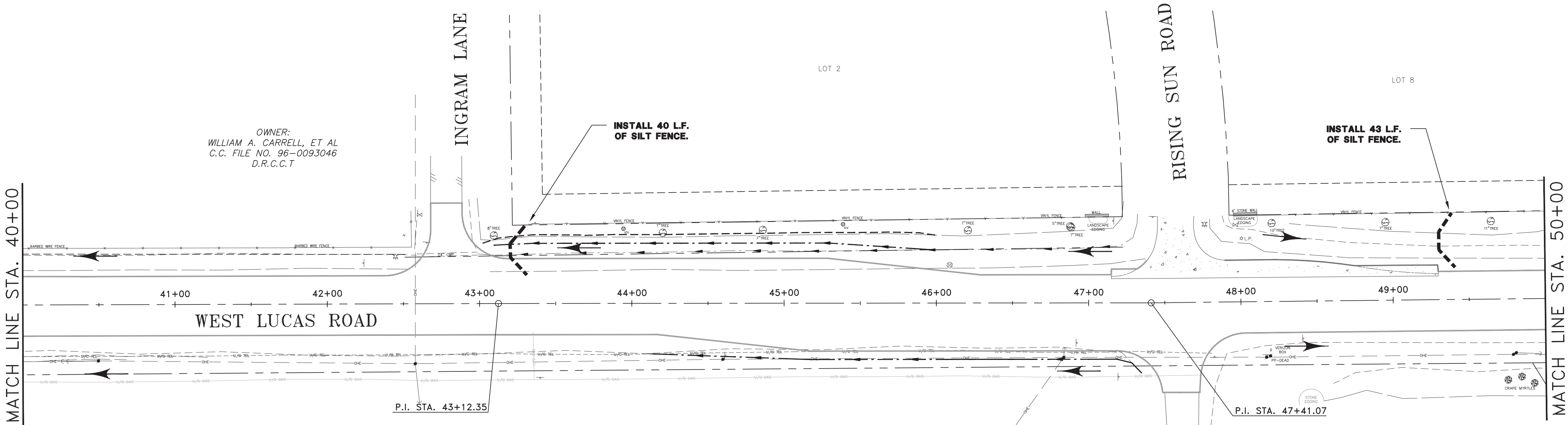
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
**EROSION CONTROL PLAN - SHEET 2 of 4**  
**CITY OF LUCAS**

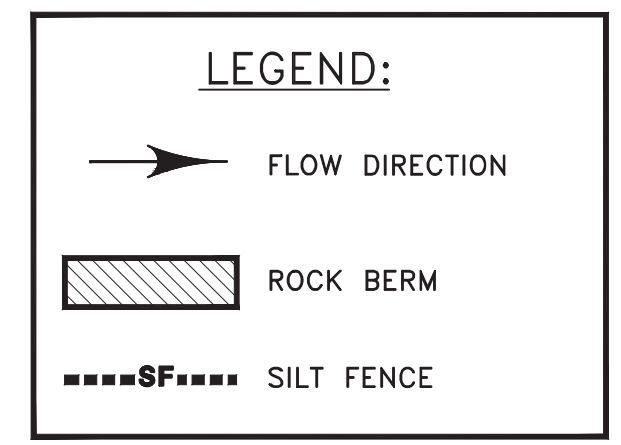
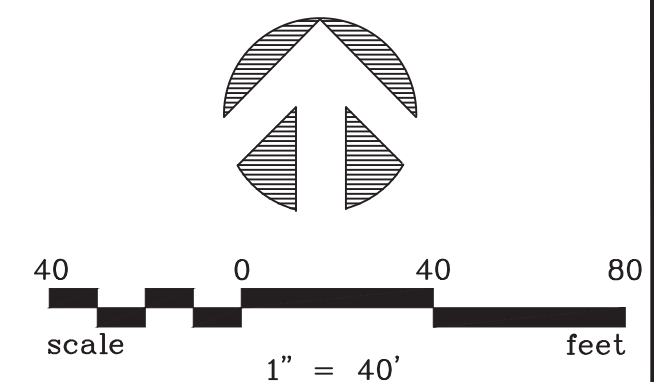
SHEET NO. 12  
 OF 51 SHEETS  
 JOB NO. 13-1623





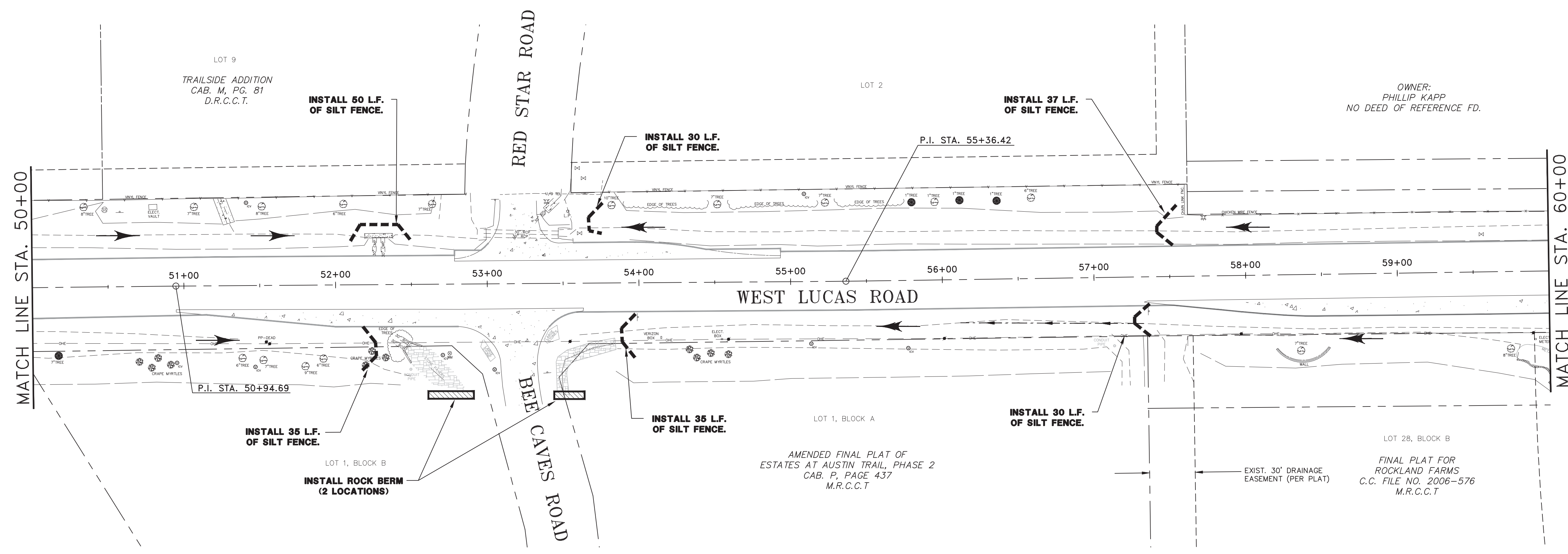
OWNER:  
WILLIAM A. CARRELL, ET AL  
C.C. FILE NO. 96-0093046  
D.R.C.C.T

OWNER:  
JACOB DANIEL KEANE & FAITH ANN KEANE  
C.C. FILE NO. 2014-0117000053320  
D.R.C.C.T



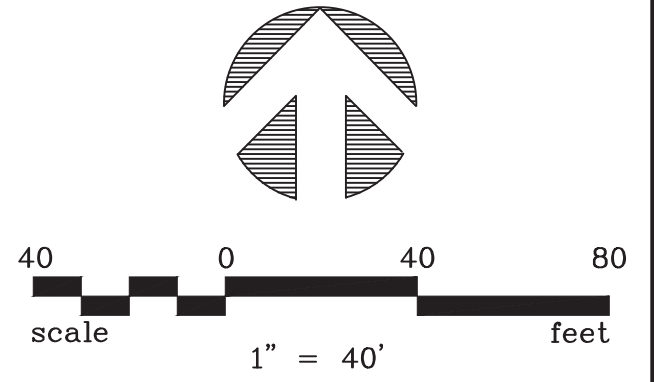
**NOTE:**

1. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL EROSION CONTROL MEASURES REQUIRED UNTIL THE CONSTRUCTION IS COMPLETE, (SEE GENERAL NOTES).



LOT 9  
TRAILSIDE ADDITION  
CAB. M. PG. 81  
D.R.C.C.T.

OWNER:  
PHILLIP KAPP  
NO DEED OF REFERENCE FD.



**!! CAUTION !!**

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BW2 Engineers, Inc.  
1919 S. SHILOH ROAD, SUITE 500  
GARLAND, TEXAS 75042  
(972) 864-8200  
RECORD DRAWINGS PREPARED ON:  
10/01/2018

NO.	DATE	REVISION	REVIEWED
6			
5			
4			
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DRAWN: \_\_\_\_\_ BW2  
DESIGN: \_\_\_\_\_ JFW  
REVIEWED: \_\_\_\_\_ MRB  
SCALE: \_\_\_\_\_ 1" = 40'  
DATE: \_\_\_\_\_ APRIL 2017  
DWG. NAME: \_\_\_\_\_ 1623ERO-CTRL03



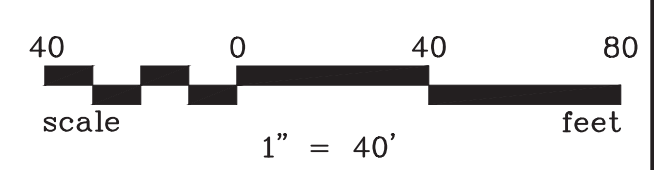
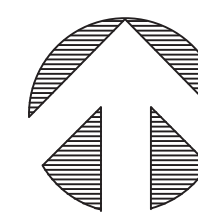
**BW2 ENGINEERS, INC.**  
1919 S. Shiloh Road  
Suite 500, L.B. 27  
Garland, Texas 75042  
(972) 864-8200 (T) (972) 864-8220 (F)  
Firm Registration No. F-5290

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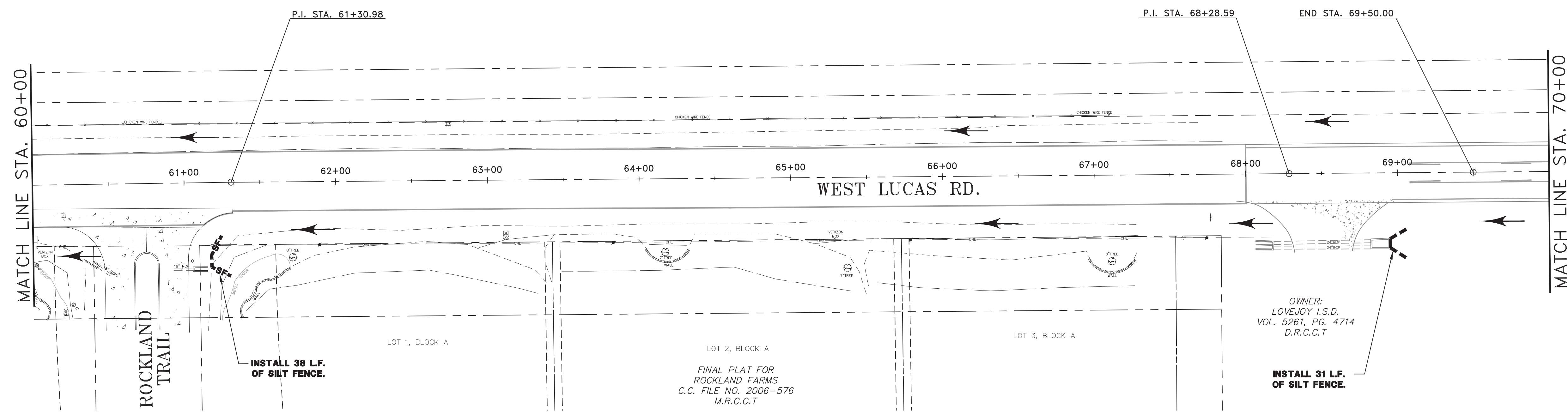
**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
EROSION CONTROL PLAN - SHEET 3 of 4  
**CITY OF LUCAS**

SHEET NO. 13  
OF 51 SHEETS  
JOB NO. 13-1623





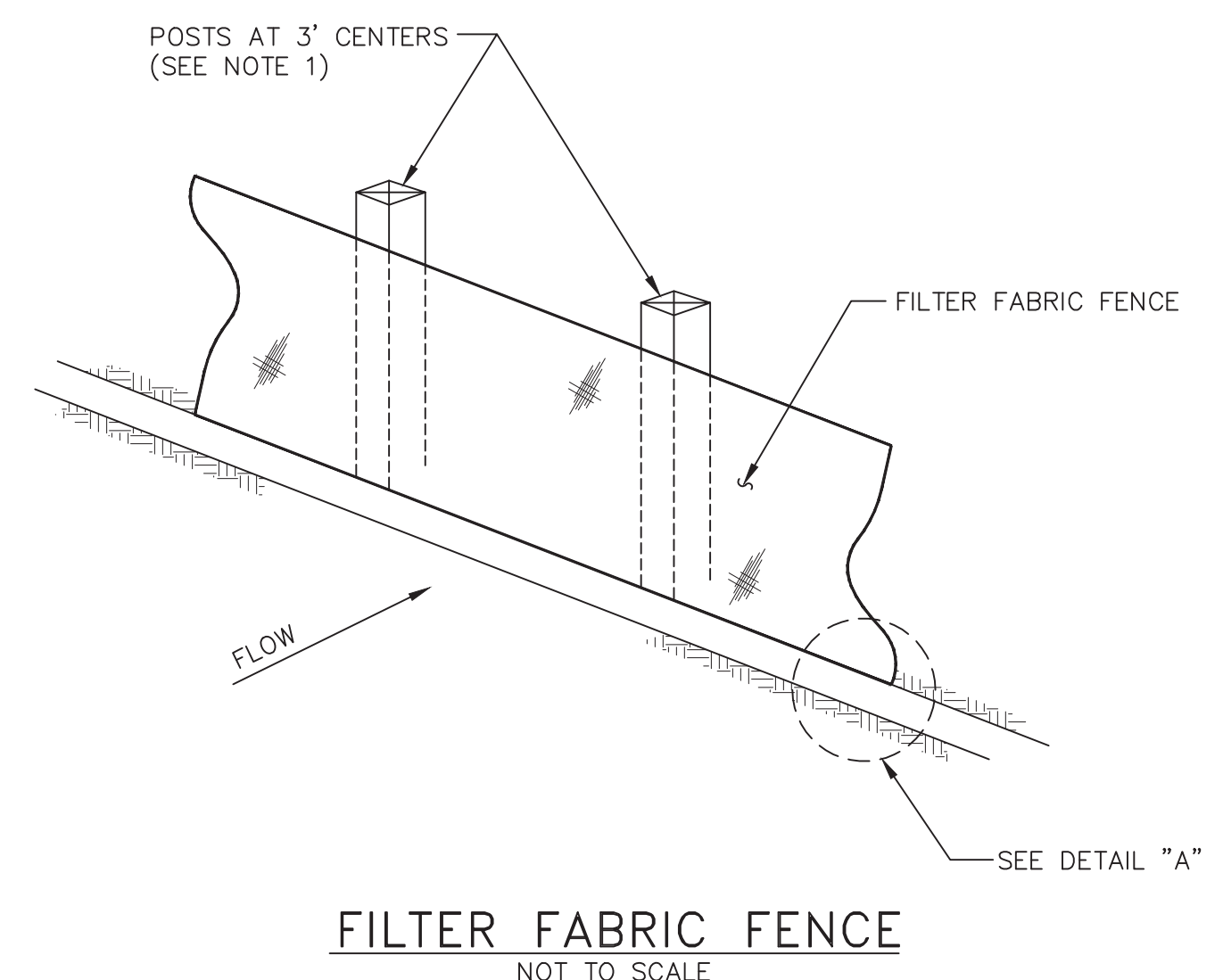
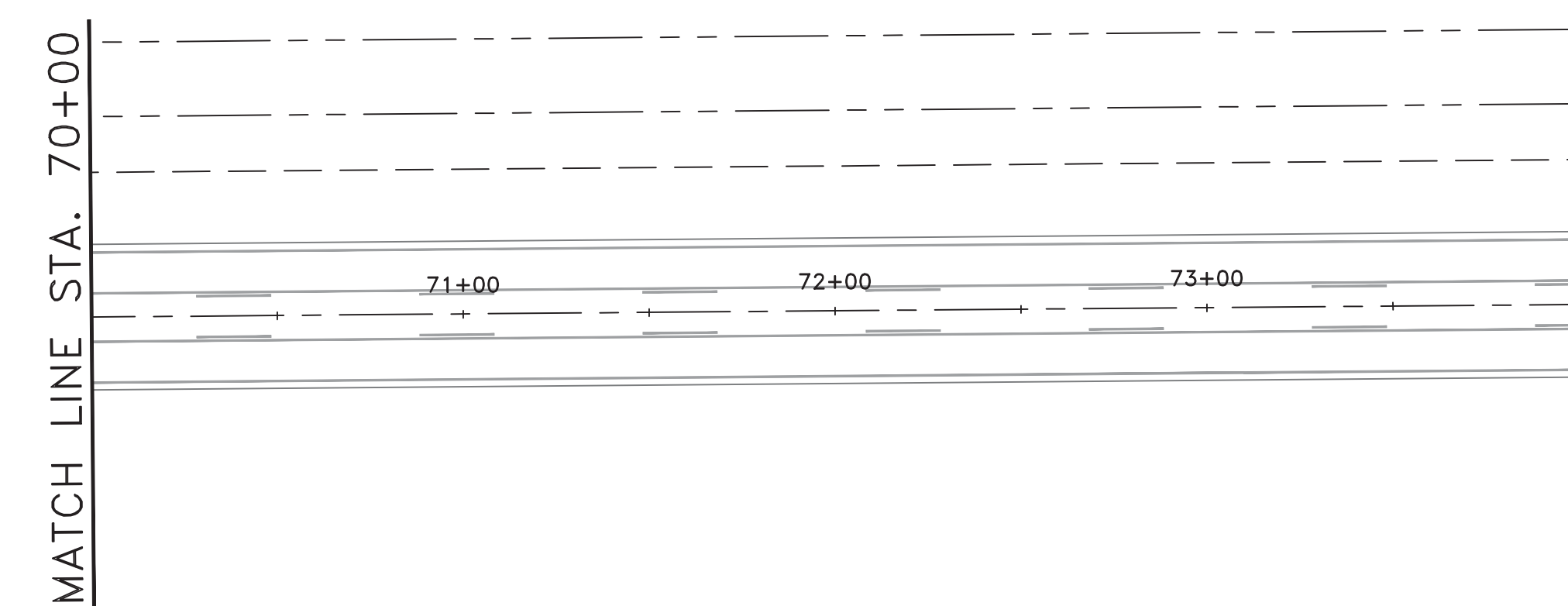
OWNER:  
PHILLIP KAPP  
NO DEED OF REFERENCE FD.



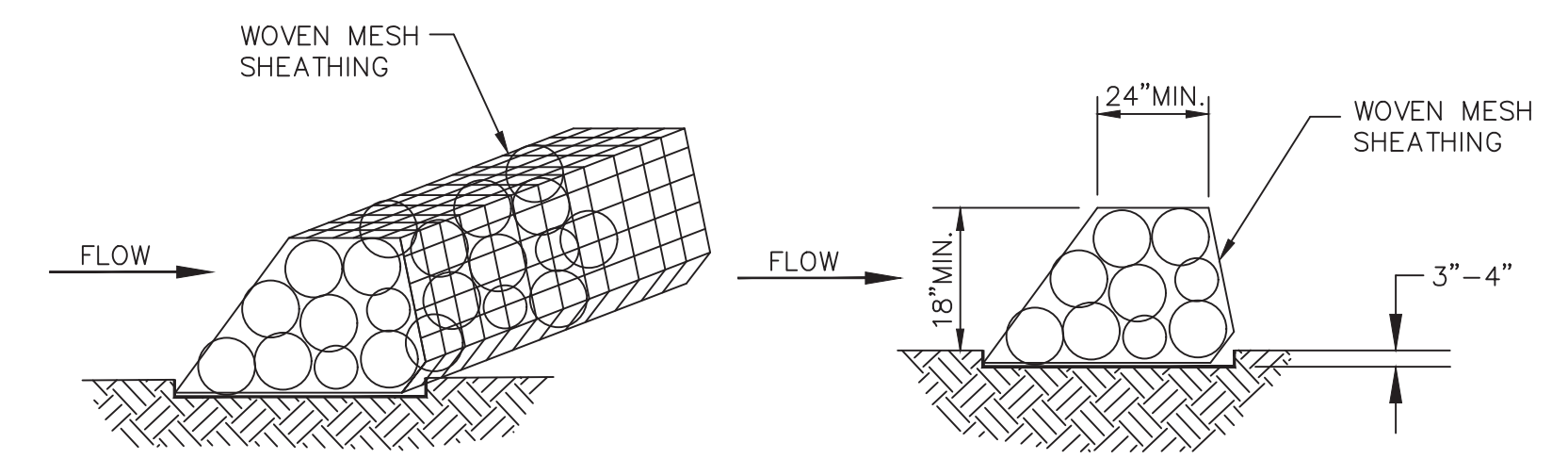
**LEGEND:**

- FLOW DIRECTION
- ROCK BERM
- SILT FENCE

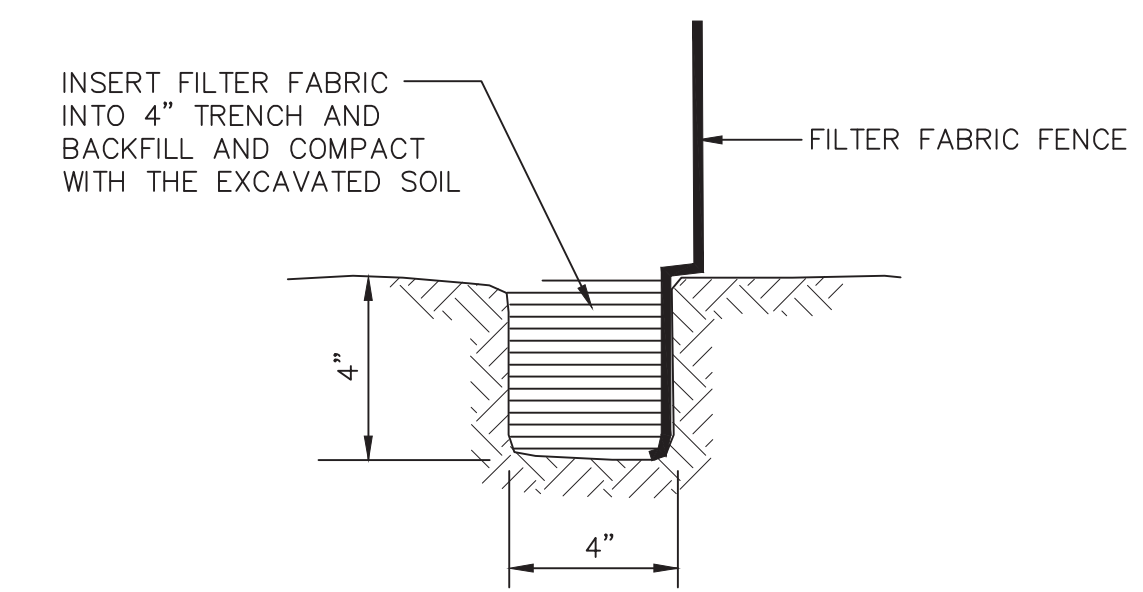
**NOTE:**  
1. THE CONTRACTOR SHALL INSTALL AND MAINTAIN ALL EROSION MEASURES REQUIRED UNTIL THE CONSTRUCTION IS COMPLETE, (SEE GENERAL NOTES).



- NOTES:**
- IF FACTORY PREASSEMBLED FENCE WITH SUPPORT NETTING IS USED, SPACING OF POSTS MAY INCREASE TO 8' MAXIMUM.
  - FILTER FABRIC SHALL BE AS PER ASTM D4833.
  - WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER, PROVIDE 6" OF OVERLAP AT THE POST AND FOLD.



**ROCK BERM DETAIL**  
NOT TO SCALE



**DETAIL "A"**  
NOT TO SCALE

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CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE 48 HOURS PRIOR TO CONSTRUCTION.

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1919 S. SHILOH ROAD, SUITE 500  
GARLAND, TEXAS 75042  
(972) 864-8200  
RECORD DRAWINGS PREPARED ON:  
10/01/2018

NO.	DATE	REVISION	REVIEWED
6			
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DRAWN:            BW2  
DESIGN:            JFW  
REVIEWED:        MRB  
SCALE:            1" = 40'  
DATE:            APRIL 2017  
DWG. NAME:        1623ERO-CTRL04

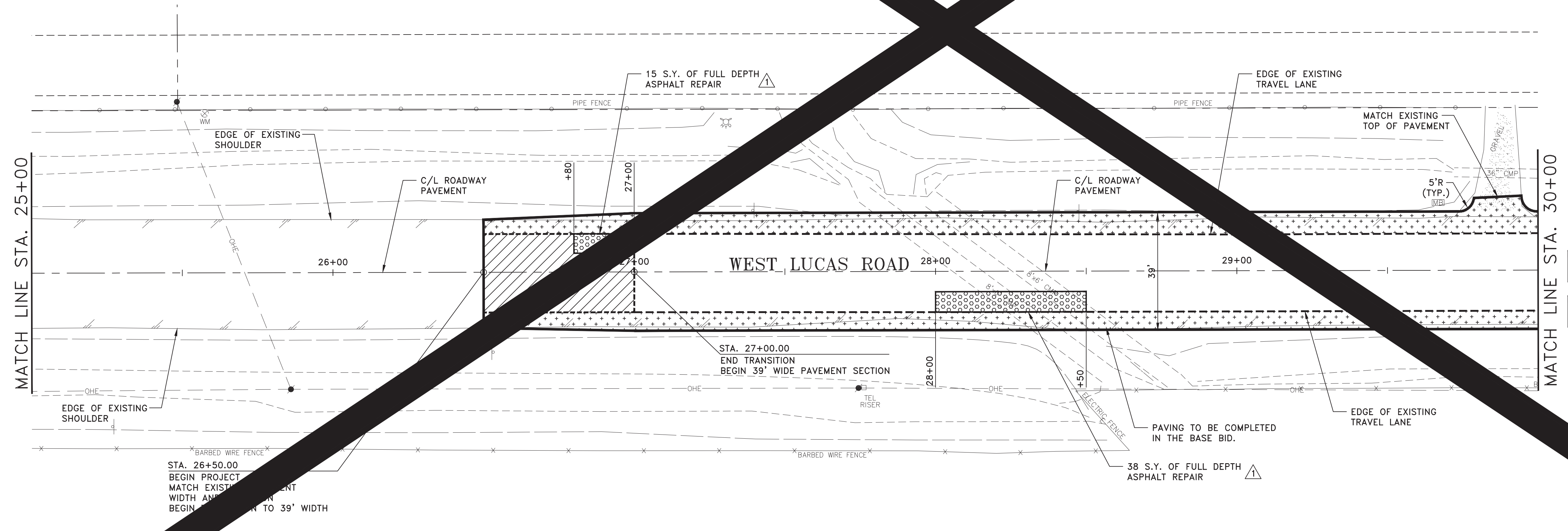
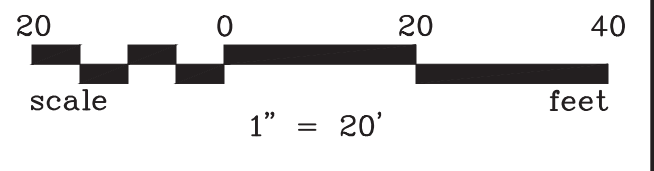
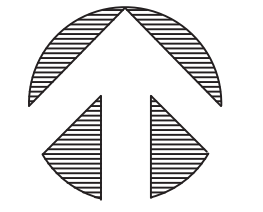
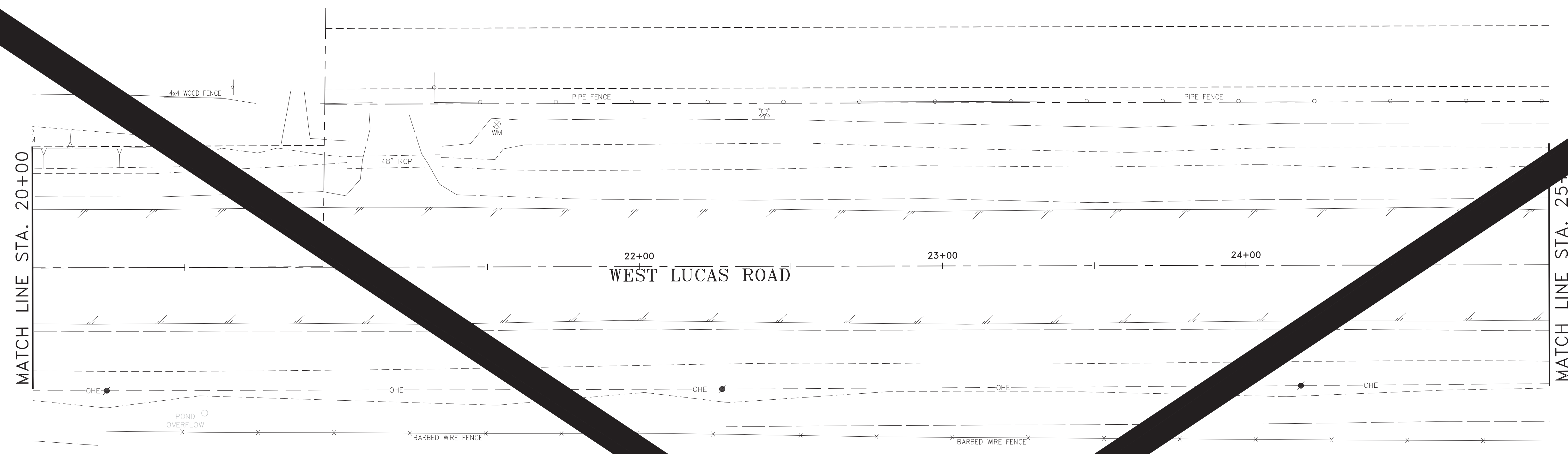
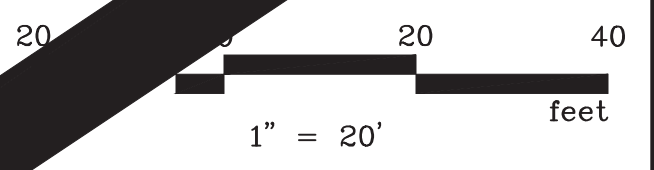


**BW2 ENGINEERS, INC.**  
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(972) 864-8200 (T) (972) 864-8220 (F)  
Firm Registration No. F-5290

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**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
**EROSION CONTROL PLAN - SHEET 4 of 4**  
**CITY OF LUCAS**

SHEET NO. 14  
OF 51 SHEETS  
JOB NO. 13-1623



- LEGEND:**
- OVERLAY - 1-1/2" TYPE 'D' HMAC SURFACE COURSE
  - REMOVE EXISTING PAVEMENT AND CONSTRUCT NEW PAVEMENT SECTION
  - 1" DEEP ASPHALT MILLING FOR TRANSITION WITH HMAC OVERLAY
  - FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY

**!! CAUTION !!**

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CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE PRIOR TO CONSTRUCTION.

6			
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1	7/17	REVISED FULL DEPTH ASPHALT REPAIR LIMITS PER FIELD CHANGE	JFW
	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623PAYPLN03

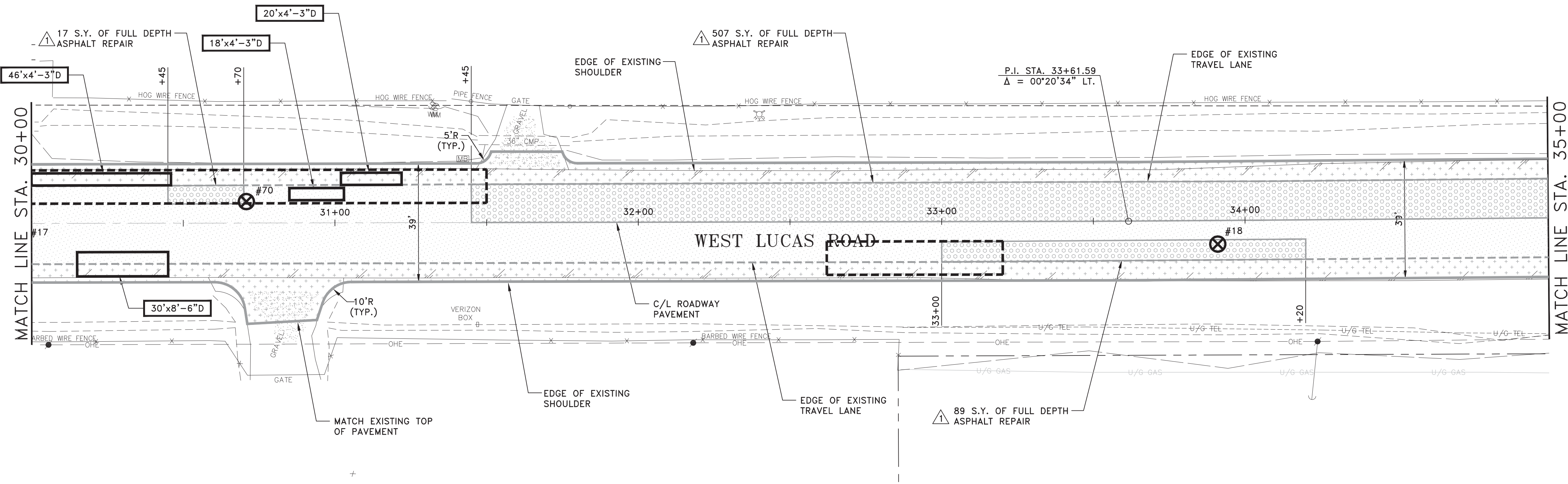
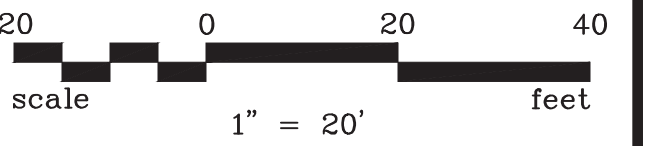
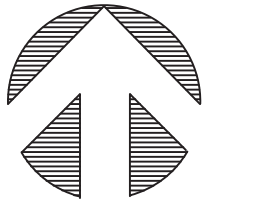


**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
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 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 PAVING PLAN - STA. 20+00 TO STA. 30+00  
 SHEET 1 OF 6  
**CITY OF LUCAS**

PROJECT NO. 15  
 OF \_\_\_\_\_ SHEETS  
 JOB NO. 13



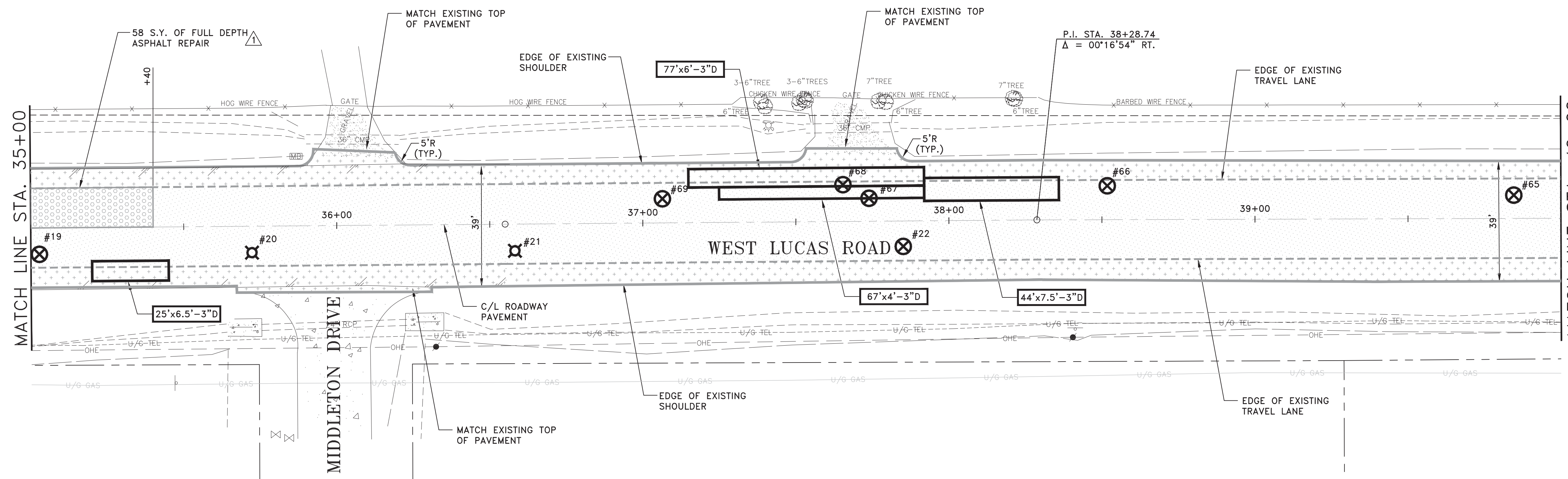


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CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE 48 HOURS PRIOR TO CONSTRUCTION.



- LEGEND:**
- OVERLAY - 1-1/2" TYPE 'D' HMAC SURFACE COURSE
  - REMOVE EXISTING PAVEMENT AND CONSTRUCT NEW PAVEMENT SECTION
  - FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY
  - ADDITIONAL PATCHES
  - ADDITIONAL MILL AND REPLACEMENT
  - CORE W/TYPE 'D' OVERLAY MORE THAN OR EQUAL TO 1.5"
  - CORE W/TYPE 'D' OVERLAY LESS THAN 1.5"

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 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

6			
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4			
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1	7/7/17	REVISED FULL DEPTH ASPHALT REPAIR LIMITS PER FIELD CHANGE	JFW
NO.	DATE	REVISION	REVIEWED

DRAWN:	BW2
DESIGN:	JFW
REVIEWED:	MRB
SCALE:	1" = 20'
DATE:	APRIL 2017
DWG. NAME:	1623PAVPLN04

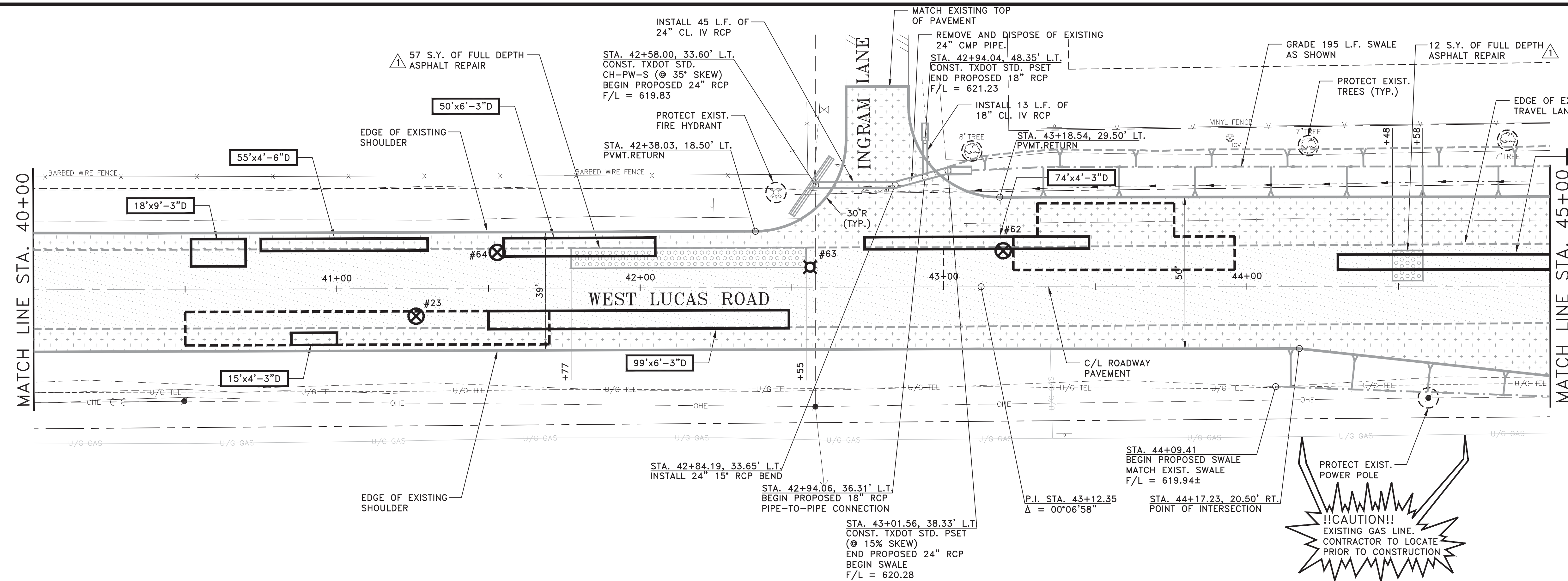
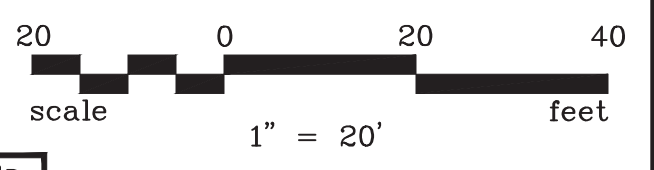
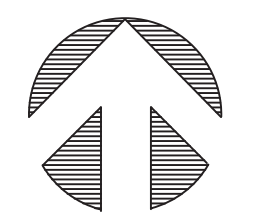
**BW2 ENGINEERS, INC.**  
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WIDENING AND OVERLAY PROJECT  
**WEST LUCAS ROAD**  
 PAVING PLAN - STA. 30+00 TO STA. 40+00  
 SHEET 2 OF 6  
**CITY OF LUCAS**

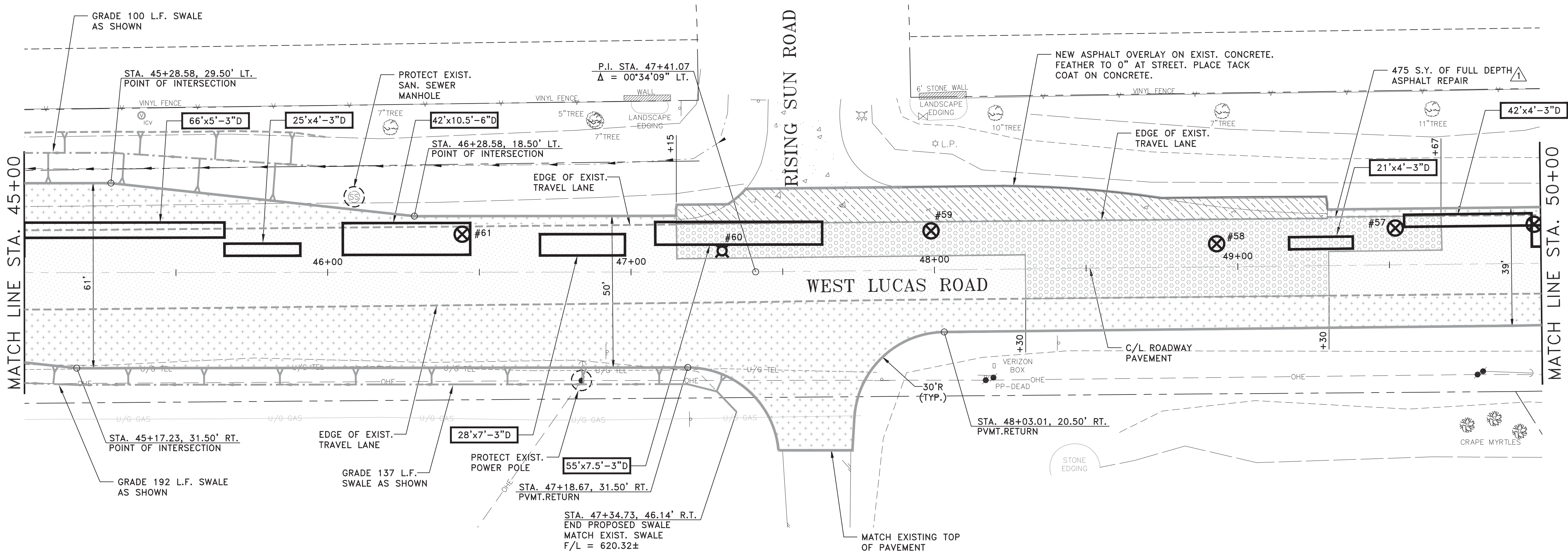
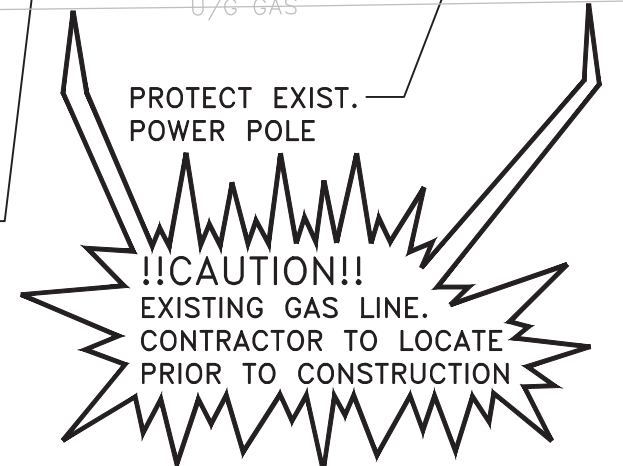
SHEET NO.	16
OF	51 SHEETS
JOB NO.	13-1623





**NOTE:**  
 1. CONTRACTOR SHALL COORDINATE WITH THE CITY FOR EXACT LOCATIONS OF FULL DEPTH ASPHALT REPAIR PRIOR TO CONSTRUCTION.

**!! CAUTION !!**  
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**LEGEND:**

	OVERLAY - 1-1/2" TYPE 'D' HMAC SURFACE COURSE
	REMOVE EXISTING PAVEMENT AND CONSTRUCT NEW PAVEMENT SECTION
	ASPHALT OVERLAY TAPER AT DRIVEWAYS
	FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY
	ADDITIONAL PATCHES
	ADDITIONAL MILL AND REPLACEMENT
	CORE W/TYPE 'D' OVERLAY MORE THAN OR EQUAL TO 1.5"
	CORE W/TYPE 'D' OVERLAY LESS THAN 1.5"

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 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

NO.	DATE	REVISION	REVIEWED
6			
5			
4			
3			
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1	7/7/17	REVISED FULL DEPTH ASPHALT REPAIR LIMITS PER FIELD CHANGE	JFW

DRAWN: BW2  
 DESIGN: JFW  
 REVIEWED: MRB  
 SCALE: 1" = 20'  
 DATE: APRIL 2017  
 DWG. NAME: 1623PAVPLN05



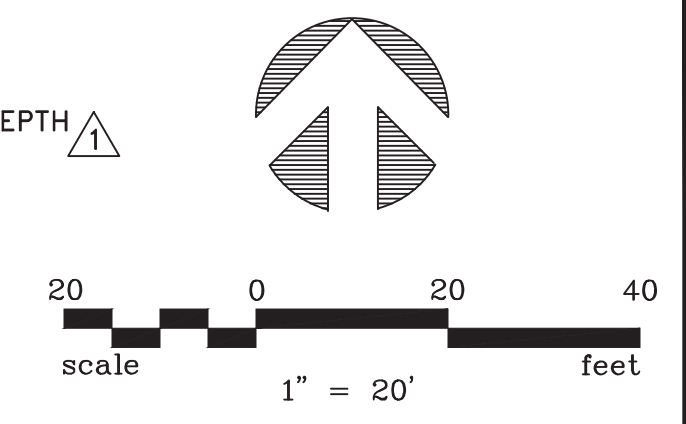
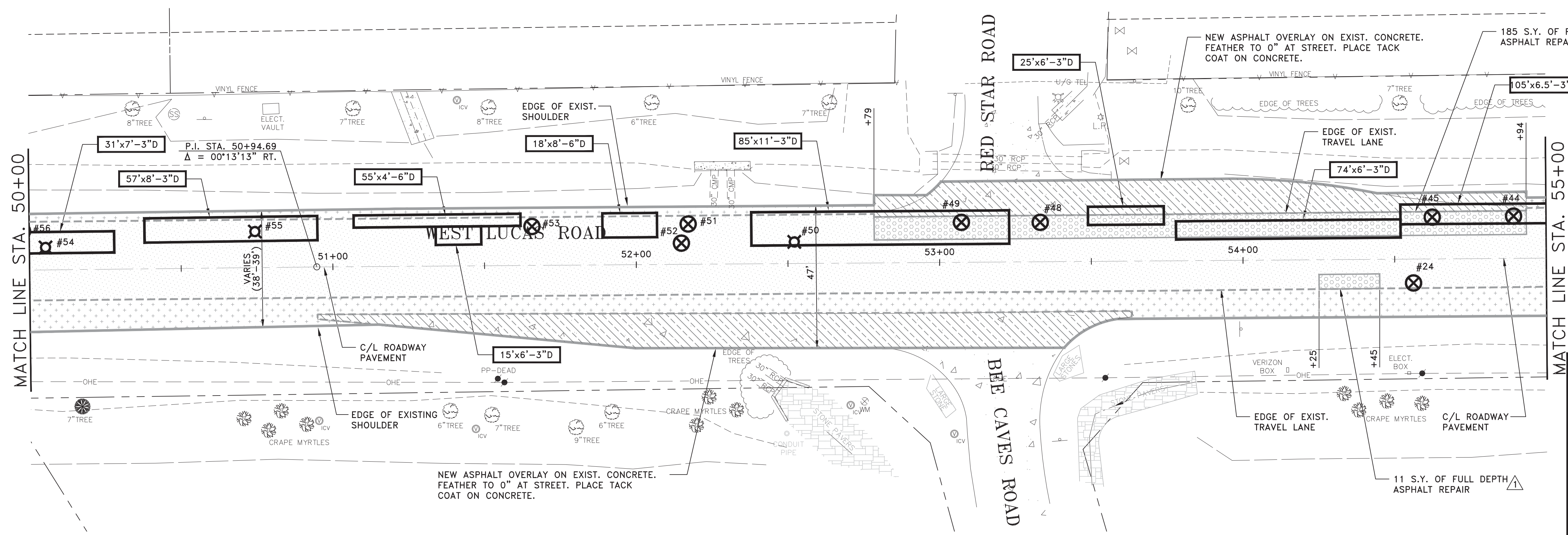
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**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
 PAVING PLAN - STA. 40+00 TO STA. 50+00  
 SHEET 3 OF 6  
**CITY OF LUCAS**

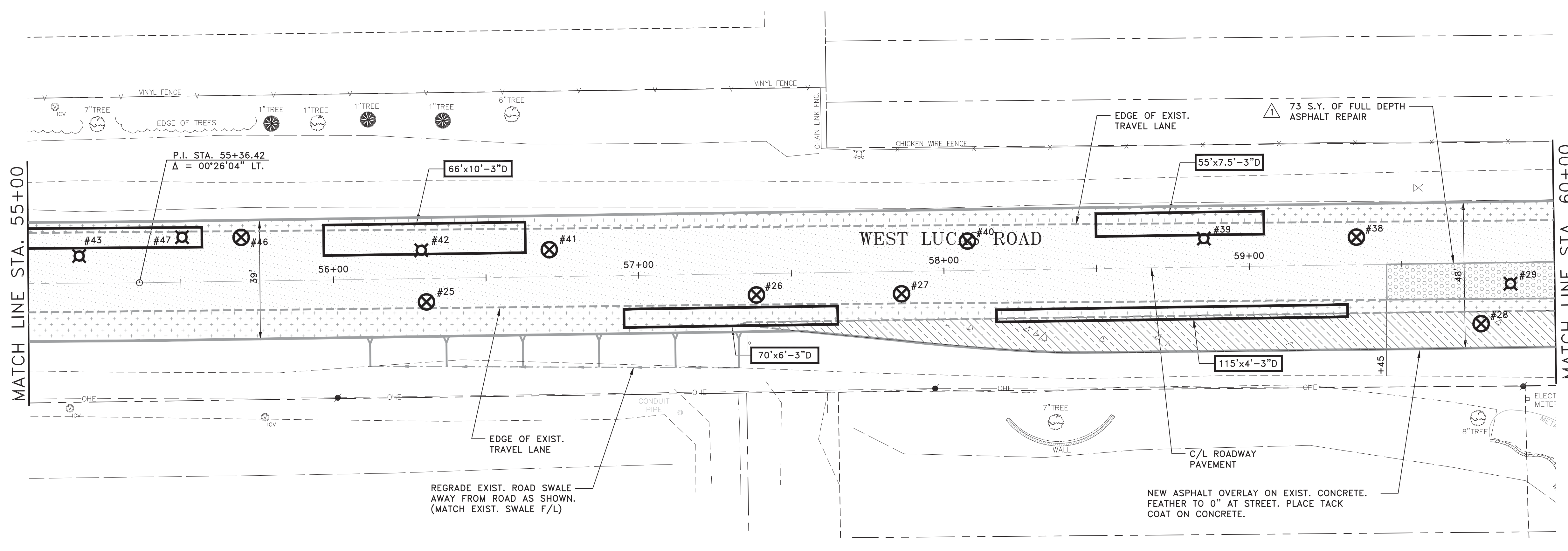
SHEET NO. 17  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
 1. CONTRACTOR SHALL COORDINATE WITH THE CITY FOR EXACT LOCATIONS OF FULL DEPTH ASPHALT REPAIR PRIOR TO CONSTRUCTION.

**!! CAUTION !!**  
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**PRIOR TO ANY EXCAVATION, CONTRACTOR SHALL CONTACT DIG-TSS, TEXAS ONE CALL, LONE STAR NOTIFICATION AND OTHERS AS REQUIRED TO LOCATE EXISTING UTILITIES.**  
 CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE 48 HOURS PRIOR TO CONSTRUCTION.



- LEGEND:**
- OVERLAY - 1-1/2" TYPE 'D' HMAC SURFACE COURSE
  - REMOVE EXISTING PAVEMENT AND CONSTRUCT NEW PAVEMENT SECTION
  - ASPHALT OVERLAY TAPER AT DRIVEWAYS
  - FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY
  - ADDITIONAL PATCHES
  - ADDITIONAL MILL AND REPLACEMENT
  - CORE W/TYPE 'D' OVERLAY MORE THAN OR EQUAL TO 1.5"
  - CORE W/TYPE 'D' OVERLAY LESS THAN 1.5"

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 BW2 Engineers, Inc.  
 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

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1	7/7/17	REVISED FULL DEPTH ASPHALT REPAIR LIMITS PER FIELD CHANGE	JFW
NO.	DATE	REVISION	REVIEWED

DRAWN: BW2  
 DESIGN: JFW  
 REVIEWED: MRB  
 SCALE: 1" = 20'  
 DATE: APRIL 2017  
 DWG. NAME: 1623PAVPLN06



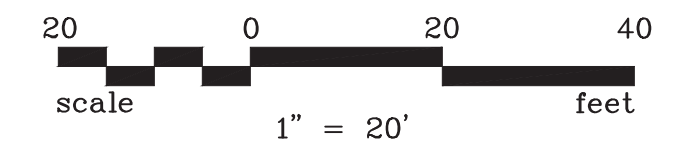
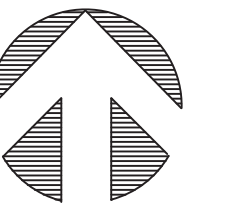
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

THE SEAL THAT ORIGINALLY APPEARED ON THIS DOCUMENT WAS AUTHORIZED BY JAMES F. WALDBAUER TEXAS P.E. 65670 ON 7/7/17 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION OF THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT.

**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
**PAVING PLAN - STA. 50+00 TO STA. 60+00**  
 SHEET 4 OF 6  
**CITY OF LUCAS**

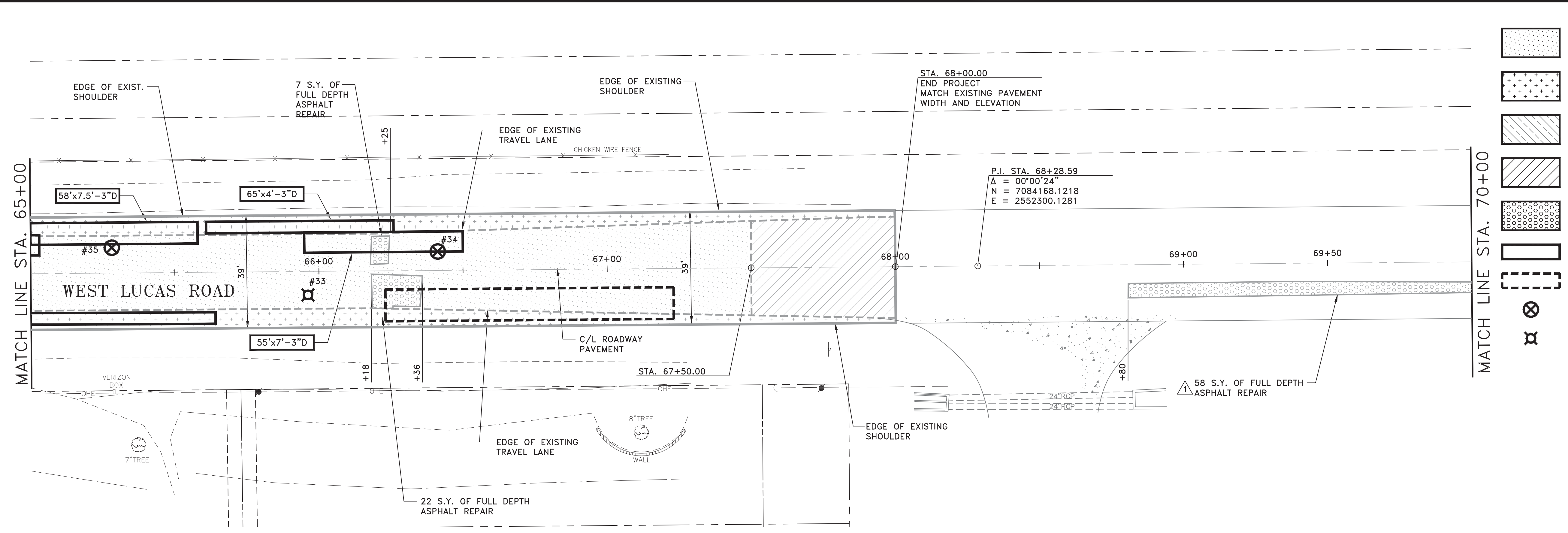
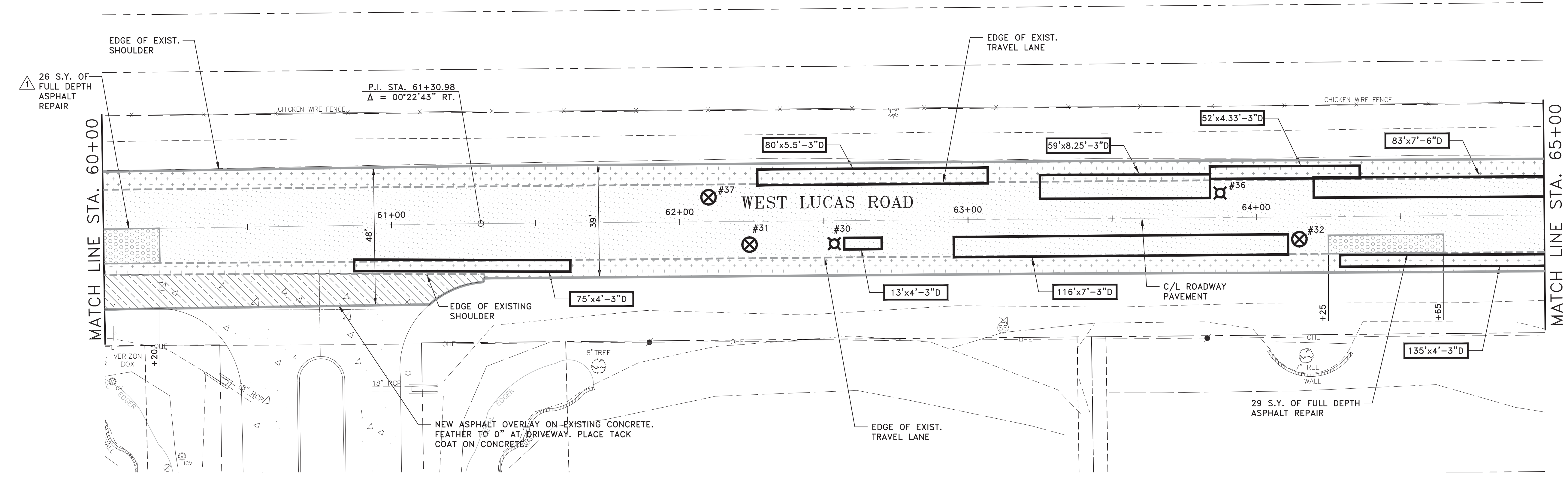
SHEET NO. 18  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
 1. CONTRACTOR SHALL COORDINATE WITH THE CITY FOR EXACT LOCATIONS OF FULL DEPTH ASPHALT REPAIR PRIOR TO CONSTRUCTION.

**!! CAUTION !!**  
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- LEGEND:**
- OVERLAY - 1-1/2" TYPE 'D' HMAC SURFACE COURSE
  - REMOVE EXISTING PAVEMENT AND CONSTRUCT NEW PAVEMENT SECTION
  - ASPHALT OVERLAY TAPER AT DRIVEWAYS
  - 1" DEEP ASPHALT MILLING FOR TRANSITION WITH HMAC OVERLAY
  - FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY
  - ADDITIONAL PATCHES
  - ADDITIONAL MILL AND REPLACEMENT
  - CORE W/TYPE 'D' OVERLAY MORE THAN OR EQUAL TO 1.5"
  - CORE W/TYPE 'D' OVERLAY LESS THAN 1.5"

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 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

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1	7/7/17	REVISED FULL DEPTH ASPHALT REPAIR LIMITS PER FIELD CHANGE	JFW
NO.	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623PAVPLN07

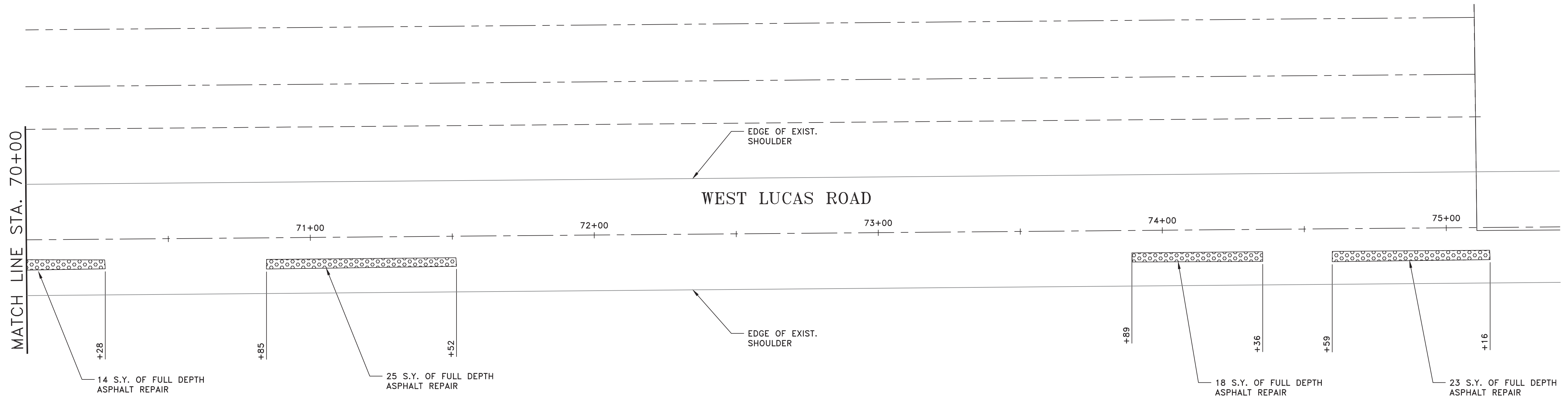
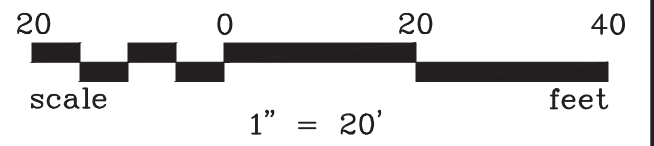
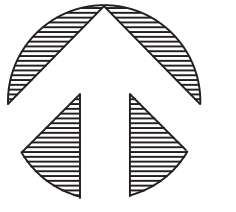
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 PAVING PLAN - STA. 60+00 TO STA. 70+00  
 SHEET 5 OF 6  
 CITY OF LUCAS**

SHEET NO. 19  
 OF 51 SHEETS  
 JOB NO. 13-1623





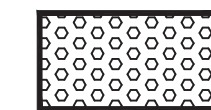
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CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE 48 HOURS PRIOR TO CONSTRUCTION.

**LEGEND:**



FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY

**NOTE:**

- CONTRACTOR SHALL COORDINATE WITH THE CITY FOR EXACT LOCATIONS OF FULL DEPTH ASPHALT REPAIR PRIOR TO CONSTRUCTION.

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 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

NO.	DATE	REVISION	REVIEWED
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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
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 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623PAYPLN08



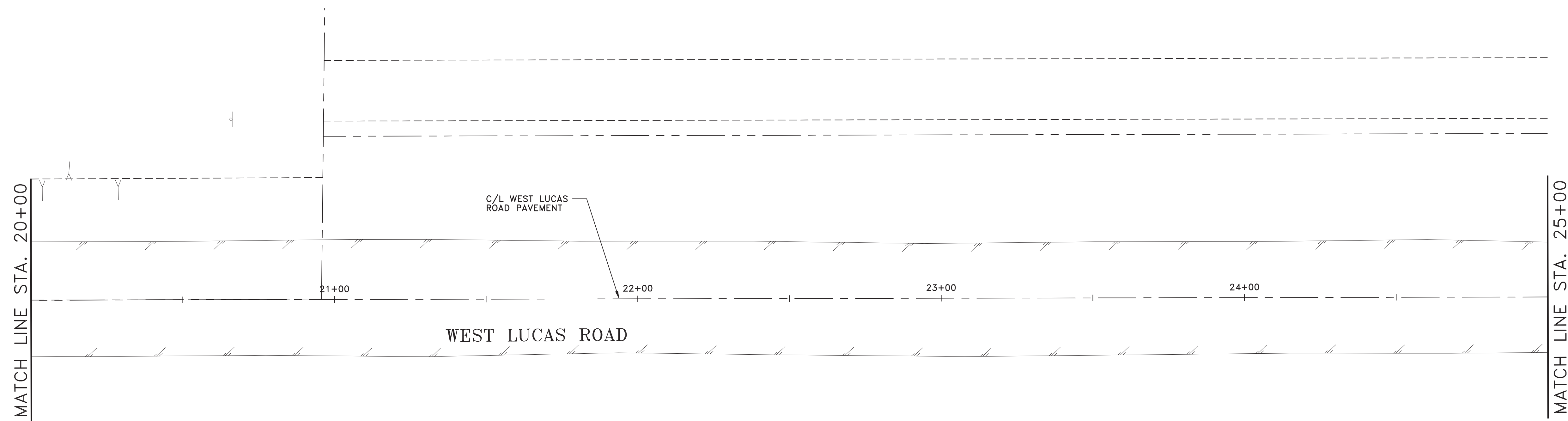
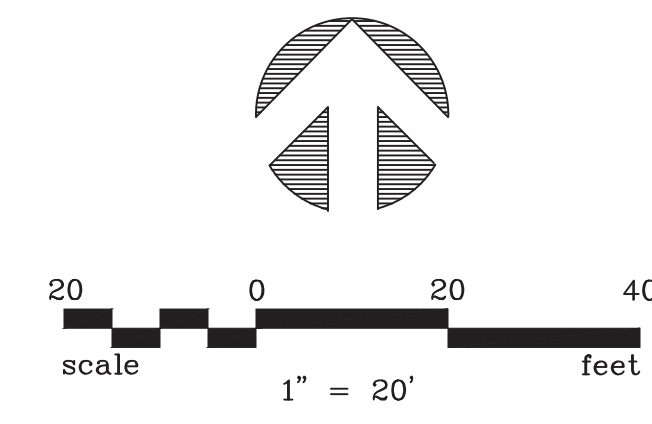
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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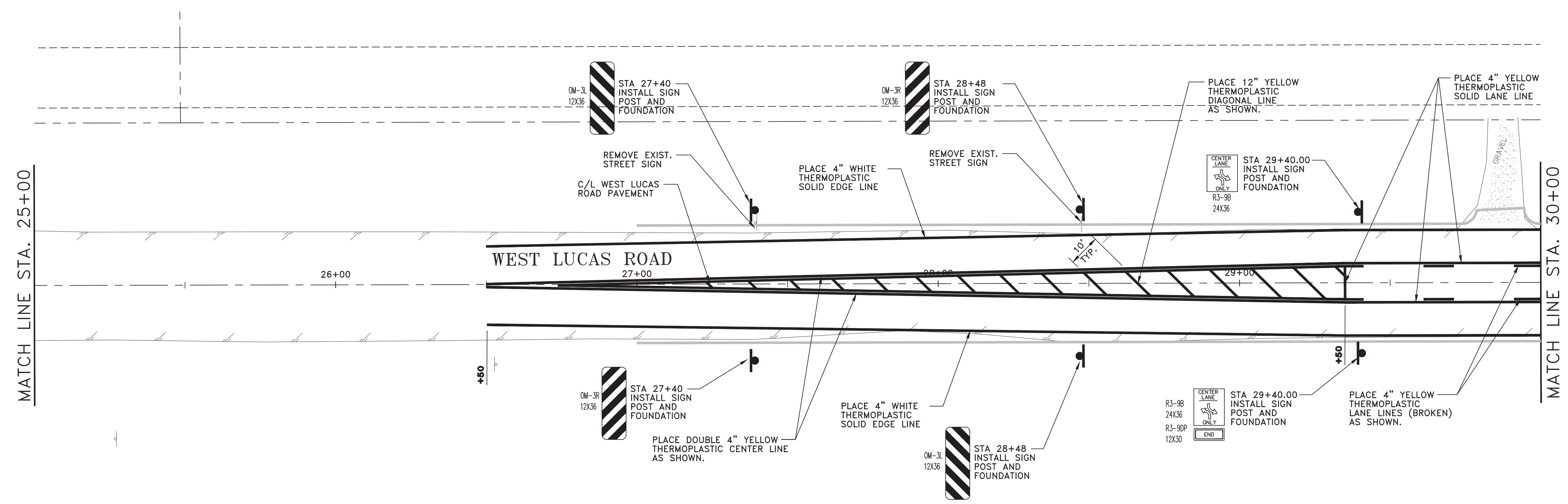
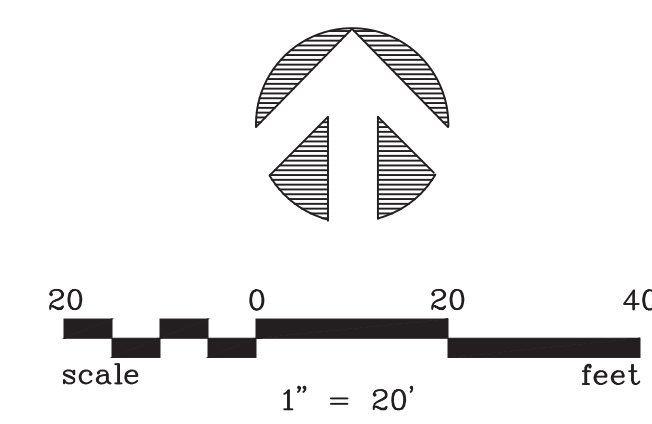
**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 PAVING PLAN - STA. 70+00 TO STA. 75+00  
 SHEET 6 OF 6  
 CITY OF LUCAS**

SHEET NO. 20  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
 1. SIGN POST SHALL BE SCH. 80 PIPE WITH SLIPBASE TYPE ANCHOR AND CONCRETE FOUNDATION. SEE TxDOT STD. DETAILS SMD (GEN)-08 AND SMD (SLIP 1-3)-08



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 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

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NO.	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623STRIP03



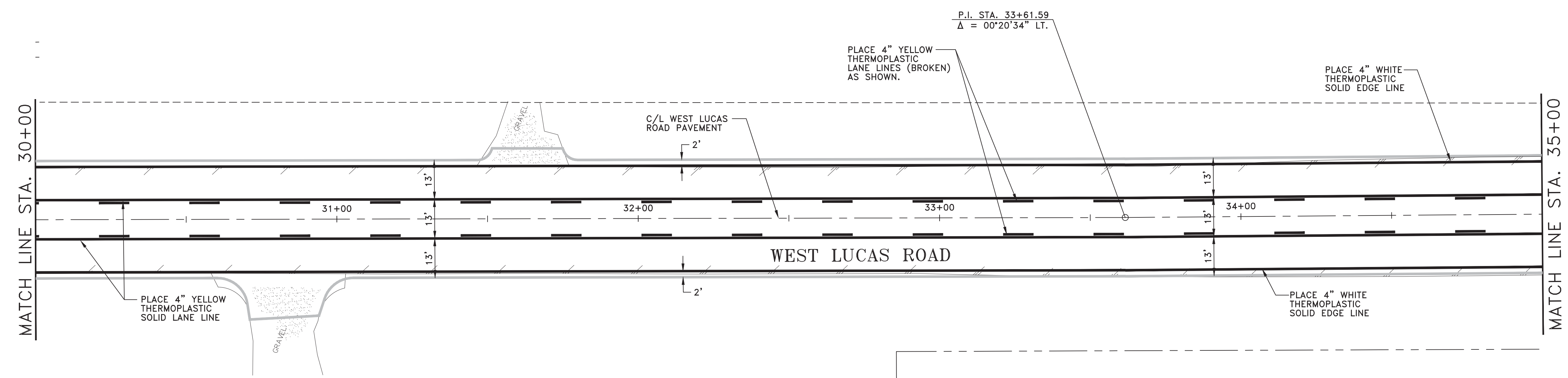
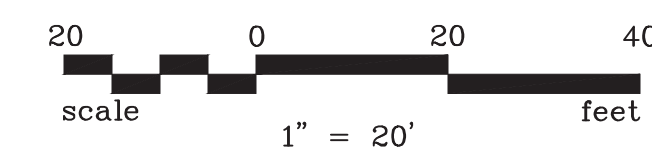
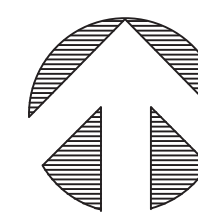
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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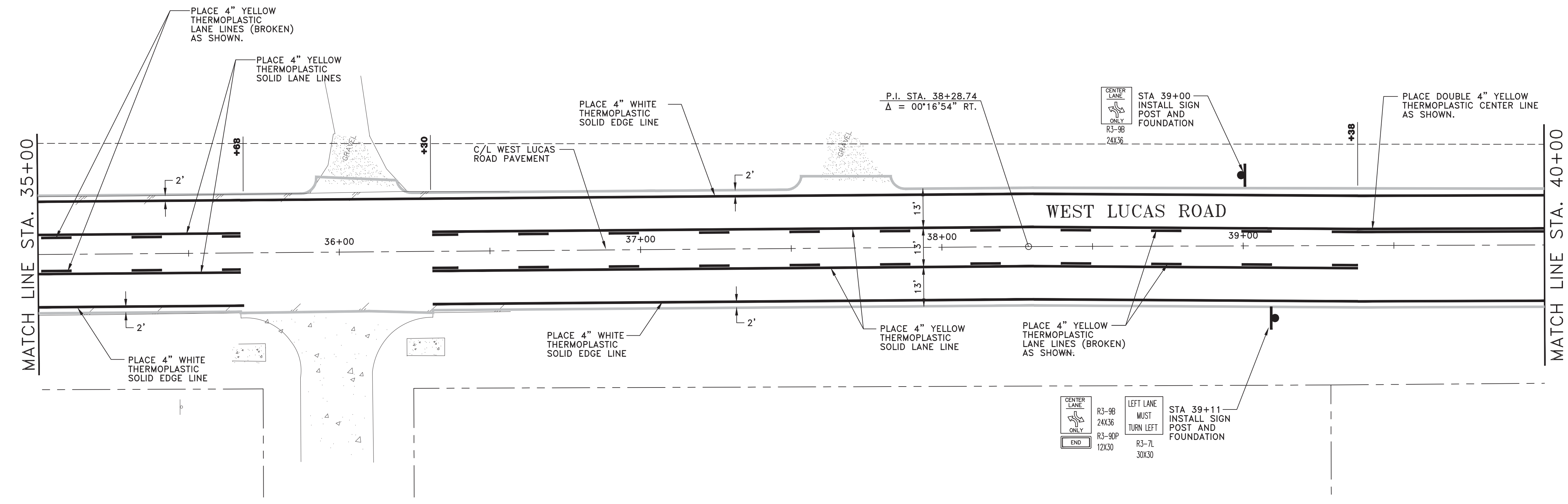
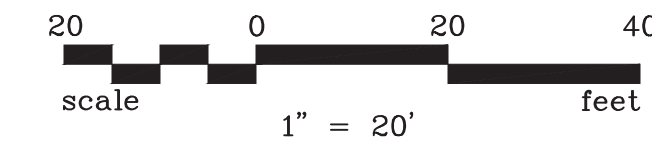
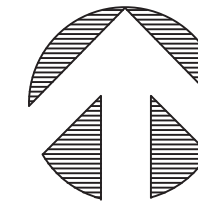
**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 STRIPING PLAN - SHEET 1 OF 5  
 CITY OF LUCAS**

SHEET NO. 21  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
 1. SIGN POST SHALL BE SCH. 80 PIPE WITH SLIPBASE TYPE ANCHOR AND CONCRETE FOUNDATION. SEE TxDOT STD. DETAILS SMD (GEN)-08 AND SMD (SLIP 1-3)-08



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 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

NO.	DATE	REVISION	REVIEWED
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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623STRIP04



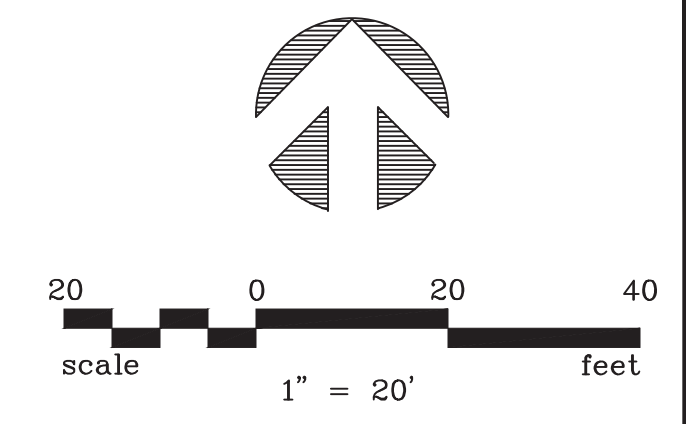
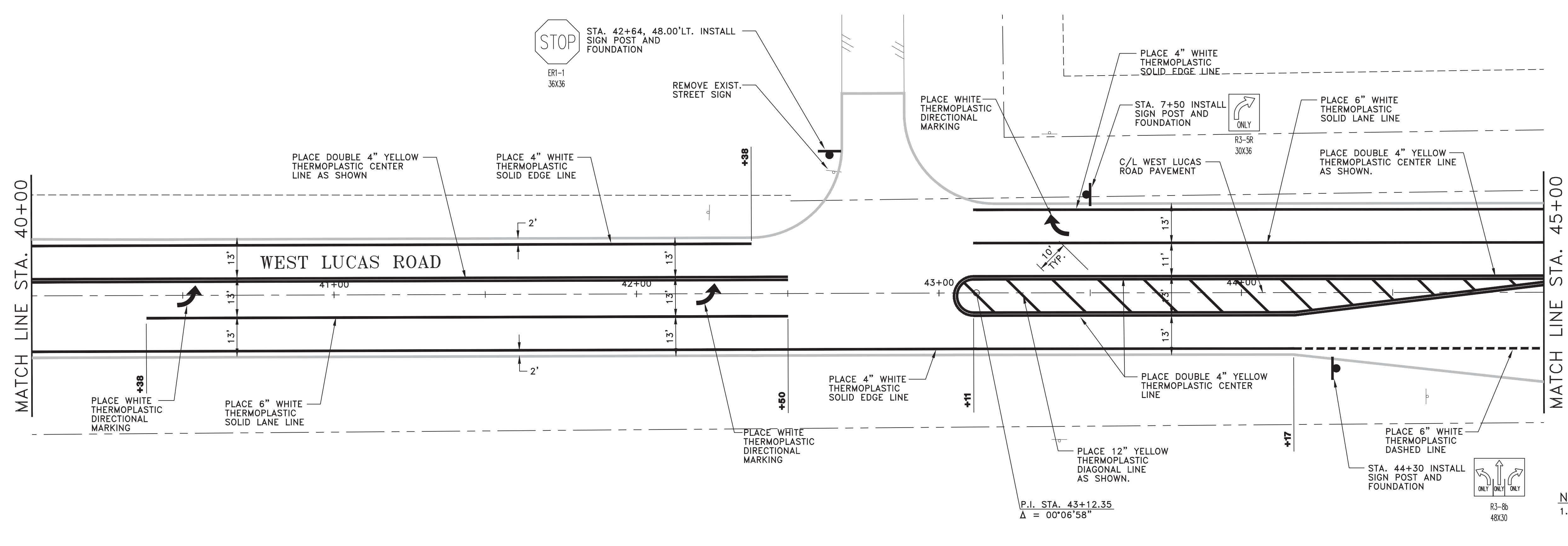
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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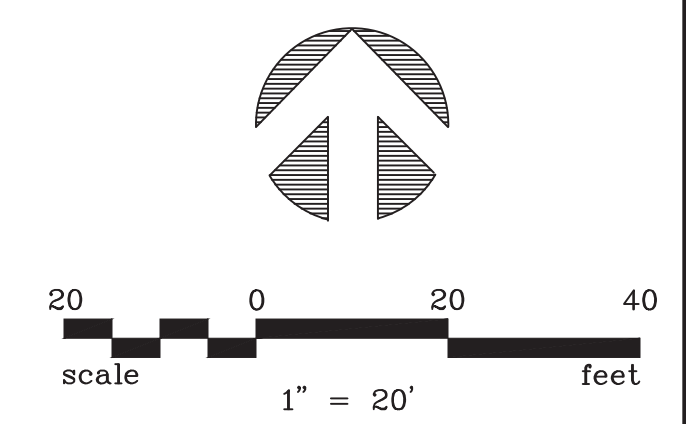
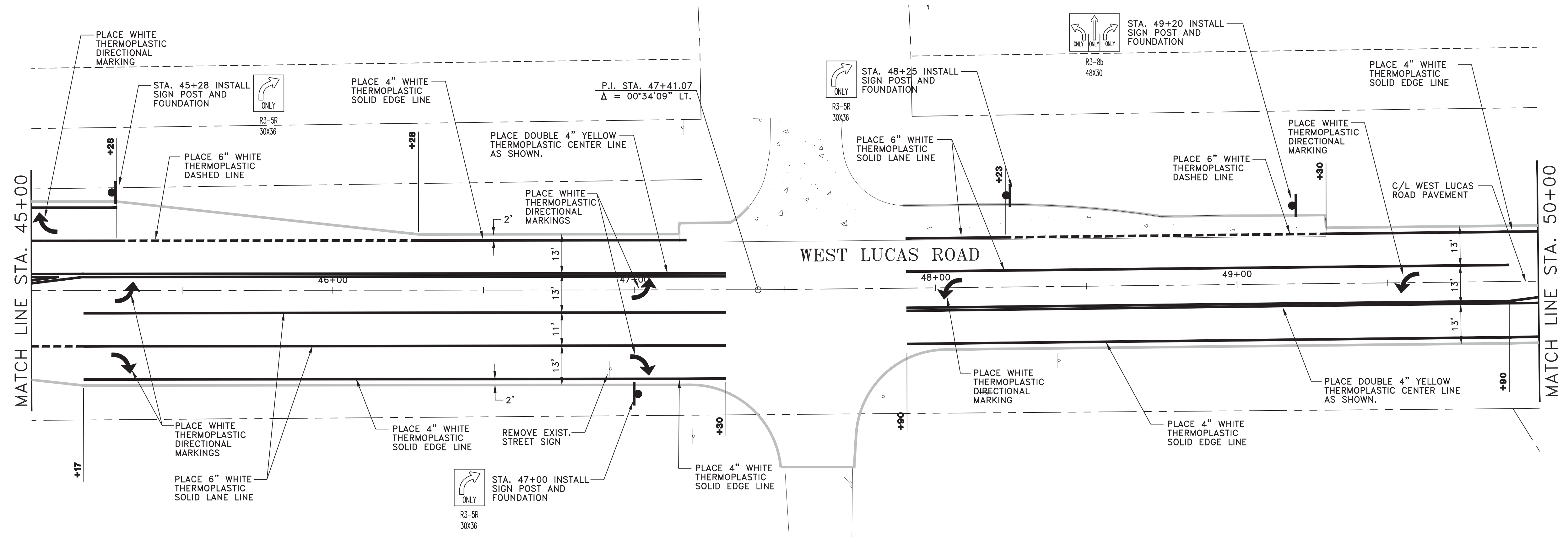
**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 STRIPING PLAN - SHEET 2 OF 5  
 CITY OF LUCAS**

SHEET NO. 22  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
 1. SIGN POST SHALL BE SCH. 80 PIPE WITH SLIPBASE TYPE ANCHOR AND CONCRETE FOUNDATION. SEE TxDOT STD. DETAILS SMD (GEN)-08 AND SMD (SLIP 1-3)-08



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 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

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NO.	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623STRIP05



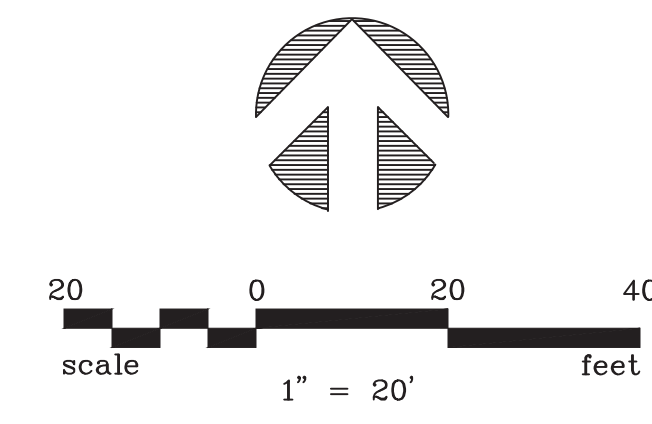
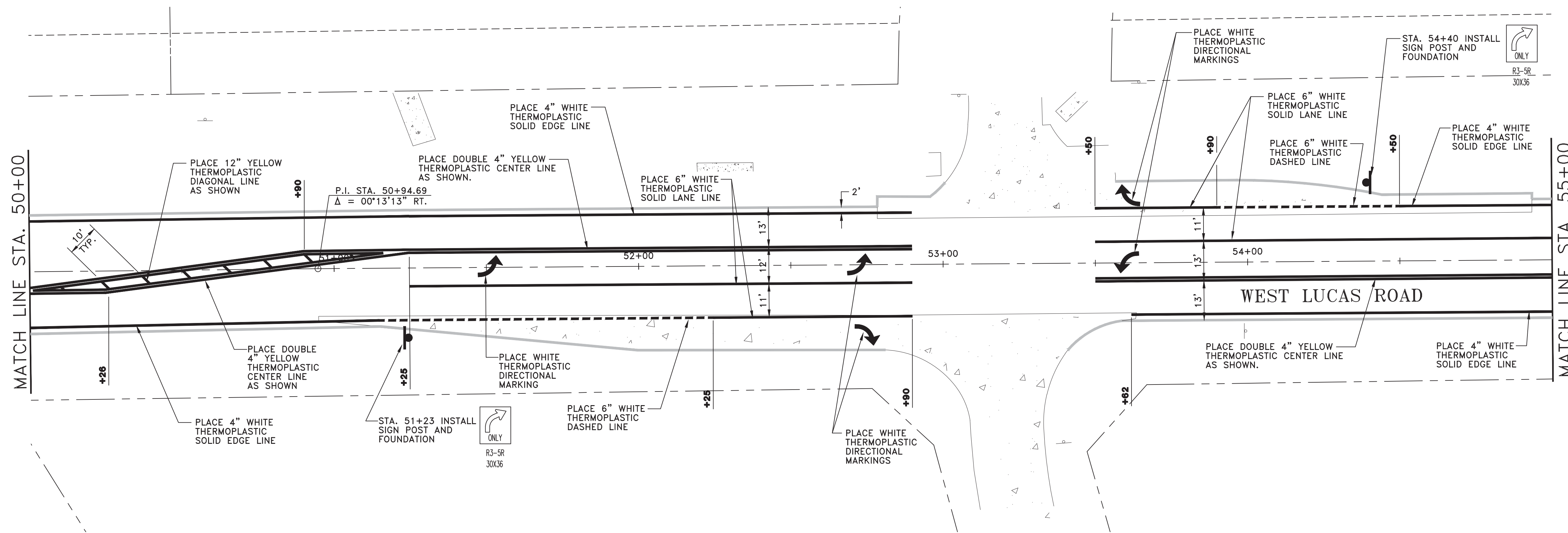
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
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 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
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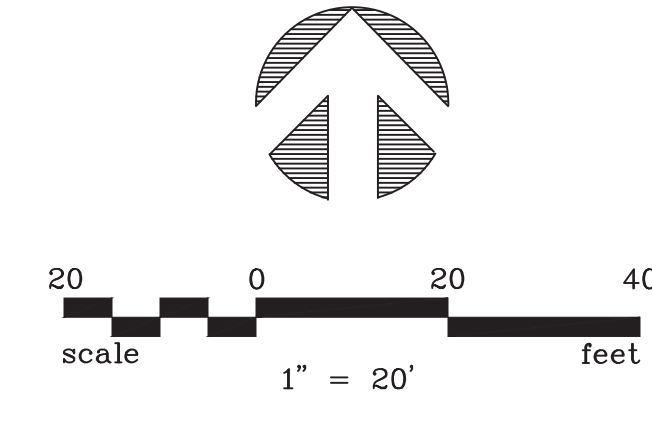
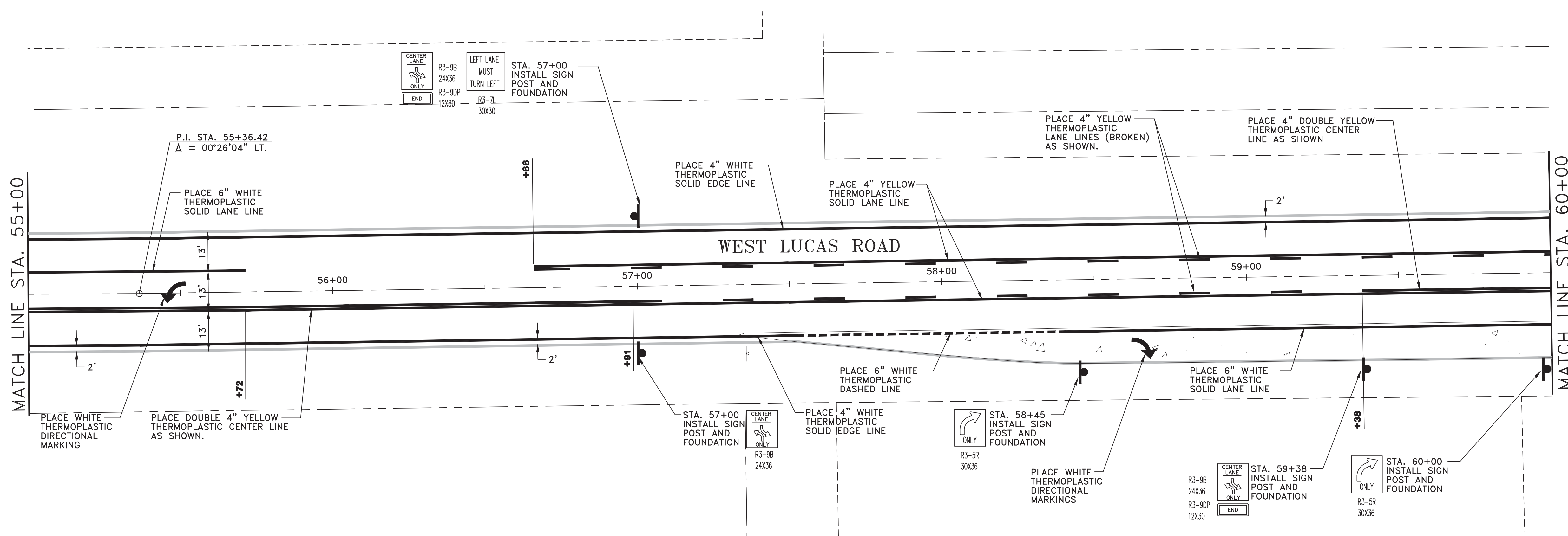
**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
**STRIPING PLAN - SHEET 3 OF 5**  
**CITY OF LUCAS**

SHEET NO. **23**  
 OF **51** SHEETS  
 JOB NO. **13-1623**





**NOTE:**  
 1. SIGN POST SHALL BE SCH. 80 PIPE WITH SLIPBASE TYPE ANCHOR AND CONCRETE FOUNDATION. SEE TxDOT STD. DETAILS SMD (GEN)-08 AND SMD (SLIP 1-3)-08



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 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

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NO.	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623STRIP06



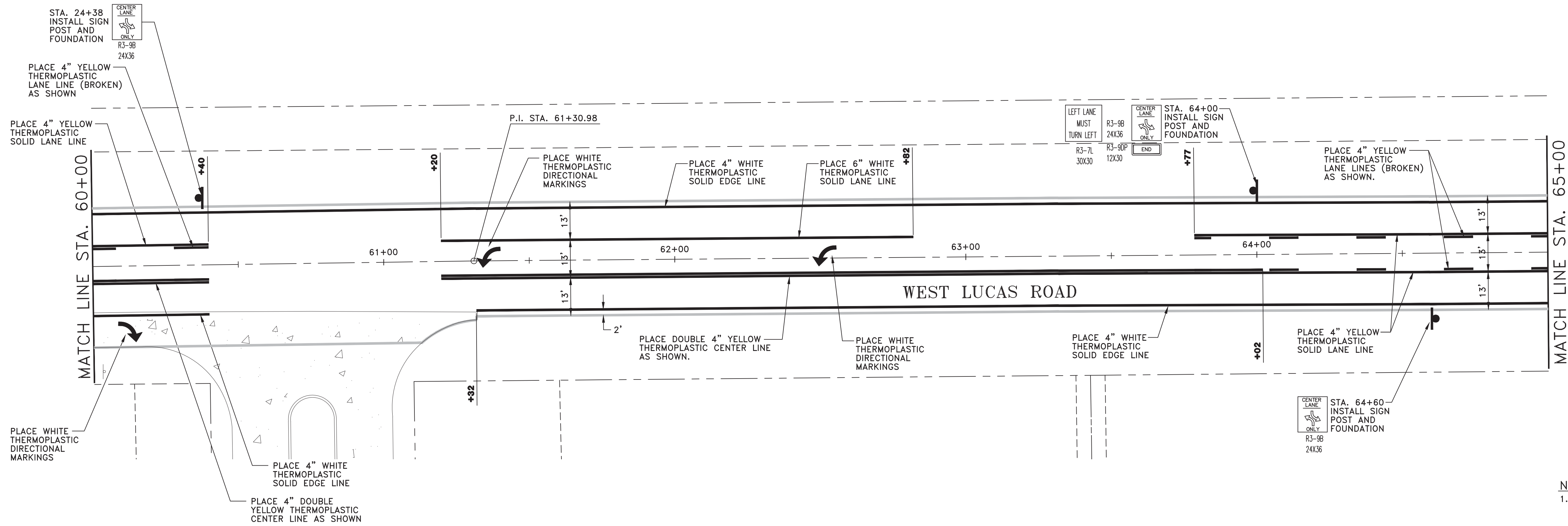
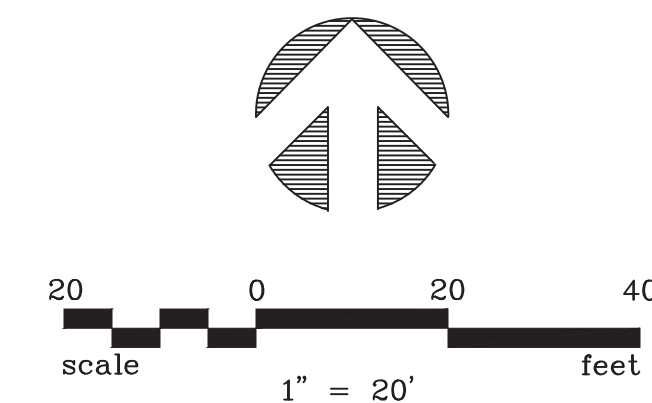
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
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 Garland, Texas 75042  
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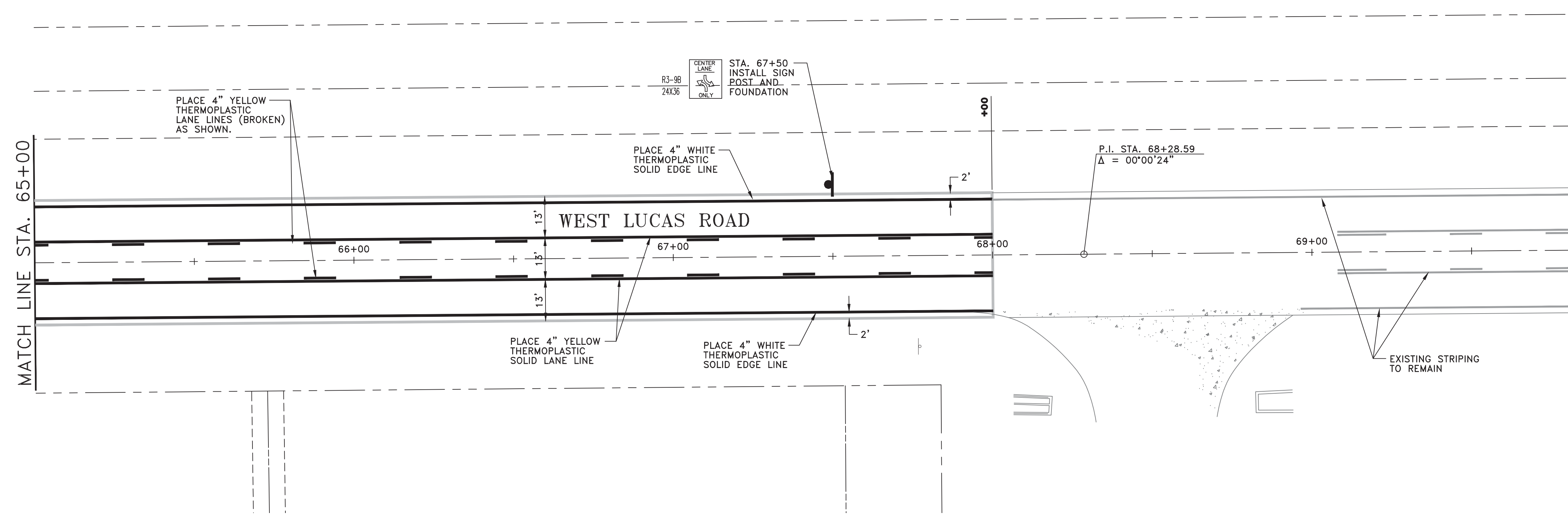
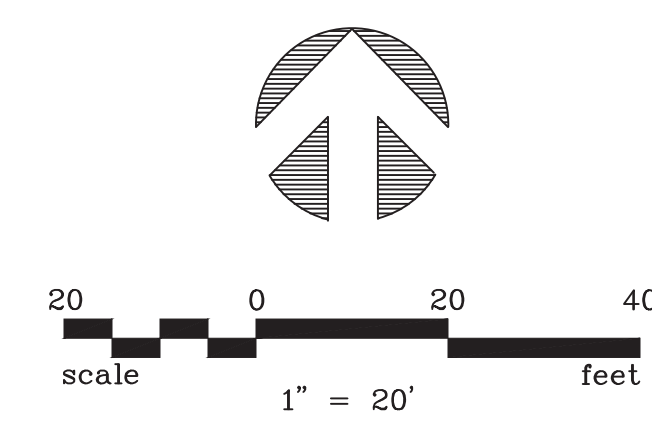
**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 STRIPING PLAN - SHEET 4 OF 5  
 CITY OF LUCAS**

SHEET NO. 24  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
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NO.	DATE	REVISION	REVIEWED
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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623STRIP07



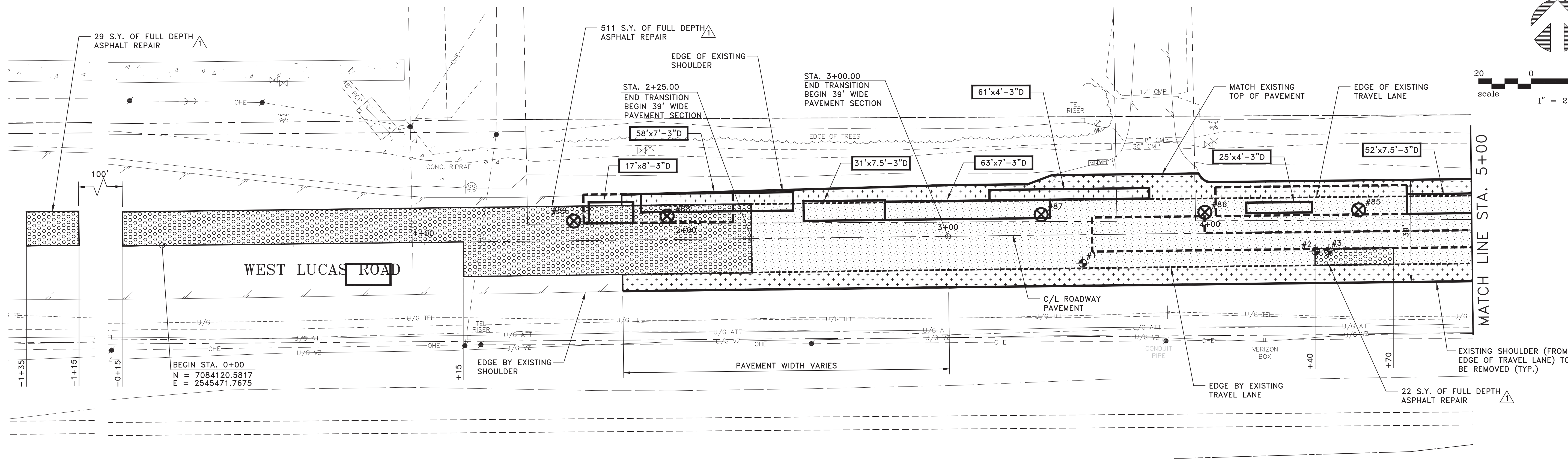
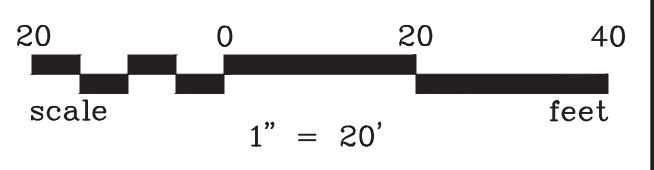
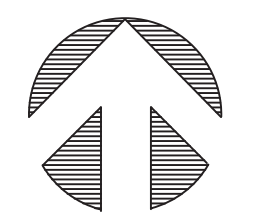
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

THE SEAL THAT ORIGINALLY APPEARED ON THIS DOCUMENT WAS AUTHORIZED BY JAMES F. WALDBAUER TEXAS P.E. 65670 ON 4/10/17 ALTERATION OF A SEALED DOCUMENT WITHOUT PROPER NOTIFICATION OF THE RESPONSIBLE ENGINEER IS AN OFFENSE UNDER THE TEXAS ENGINEERING PRACTICE ACT.

**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 STRIPING PLAN - SHEET 5 OF 5  
 CITY OF LUCAS**

SHEET NO. 25  
 OF 51 SHEETS  
 JOB NO. 13-1623



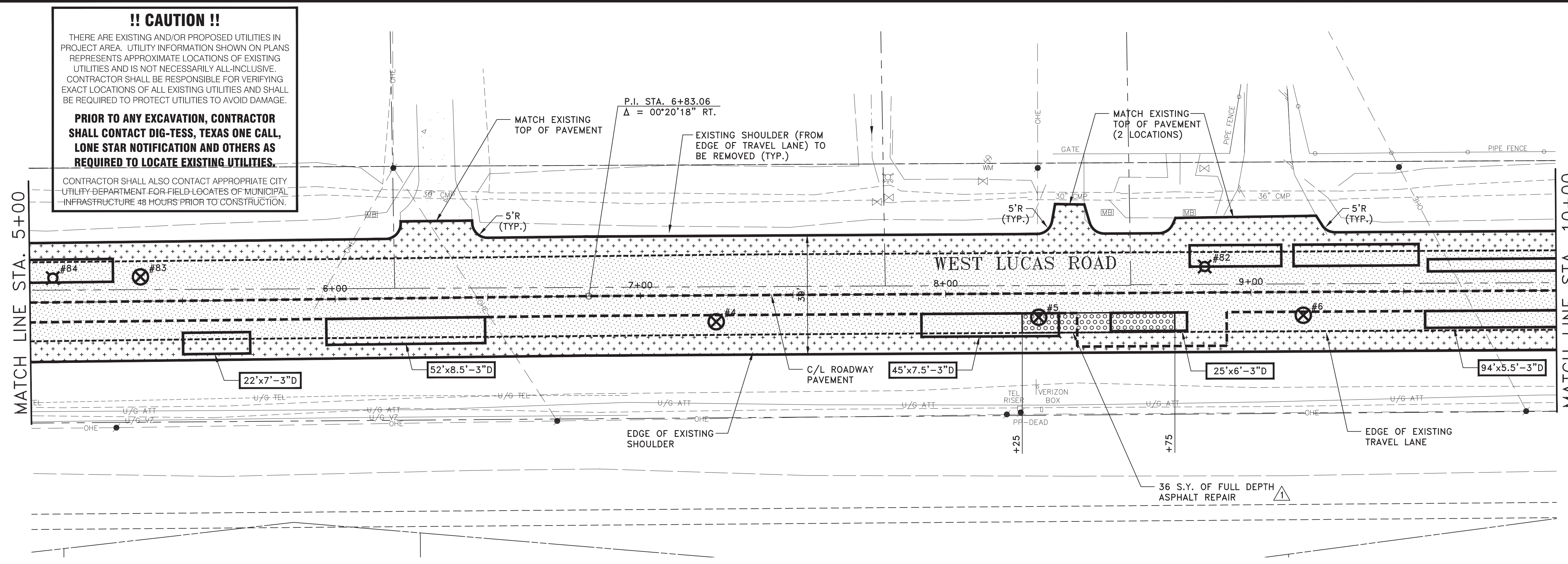


**!! CAUTION !!**


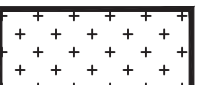


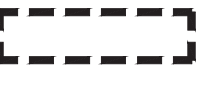


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**PRIOR TO ANY EXCAVATION, CONTRACTOR SHALL CONTACT DIG-TESS, TEXAS ONE CALL, LONE STAR NOTIFICATION AND OTHERS AS REQUIRED TO LOCATE EXISTING UTILITIES.**

CONTRACTOR SHALL ALSO CONTACT APPROPRIATE CITY UTILITY DEPARTMENT FOR FIELD LOCATES OF MUNICIPAL INFRASTRUCTURE 48 HOURS PRIOR TO CONSTRUCTION.



**LEGEND:**

-  OVERLAY - 1-1/2" TYPE 'D' HMAC SURFACE COURSE
-  REMOVE EXISTING PAVEMENT AND CONSTRUCT NEW PAVEMENT SECTION
-  FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY
-  ADDITIONAL PATCHES
-  ADDITIONAL MILL AND REPLACEMENT
-  CORE W/TYPE 'D' OVERLAY MORE THAN OR EQUAL TO 1.5"
-  CORE W/TYPE 'D' OVERLAY LESS THAN 1.5"

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 BW2 Engineers, Inc.  
 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

6			
5			
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1	7/7/17	REVISED FULL DEPTH ASPHALT REPAIR LIMITS PER FIELD CHANGE	JFW
NO.	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623PAVPLN01



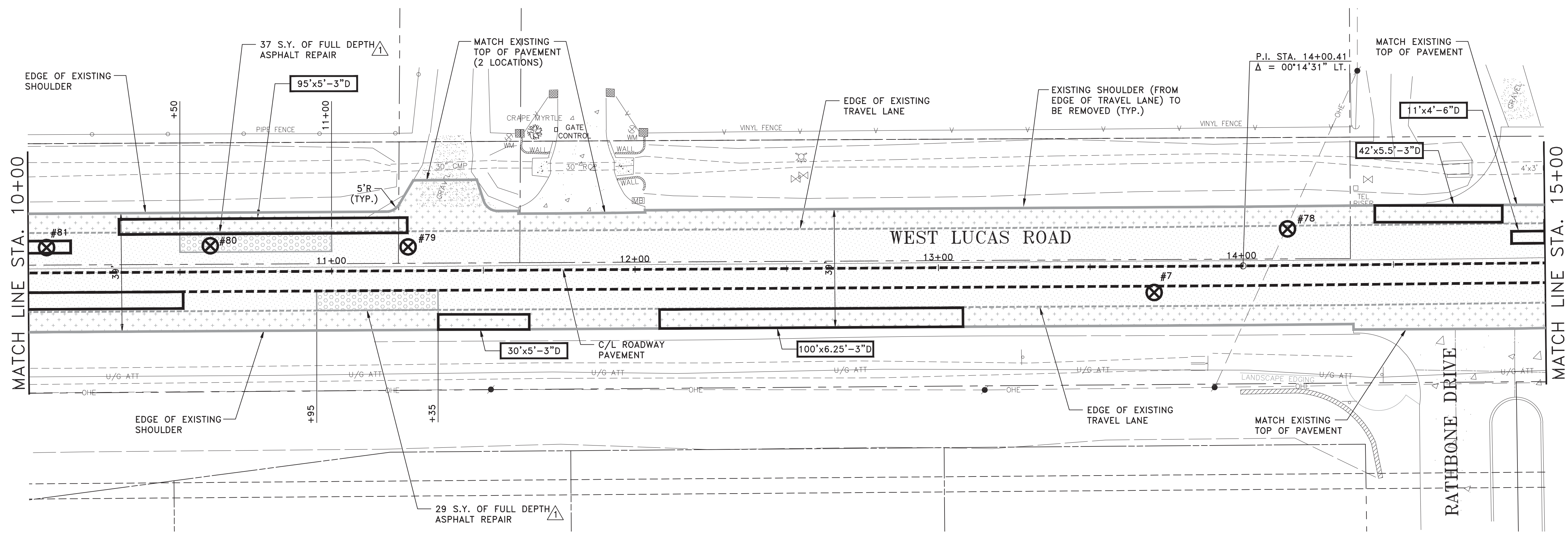
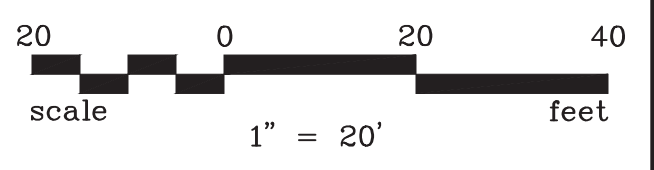
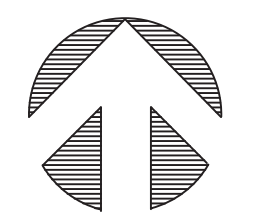
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
 ADD ALT. PAVING PLAN - STA. 0+00 TO STA. 10+00  
 SHEET 1 OF 3  
**CITY OF LUCAS**

SHEET NO. 26  
 OF 51 SHEETS  
 JOB NO. 13-1623



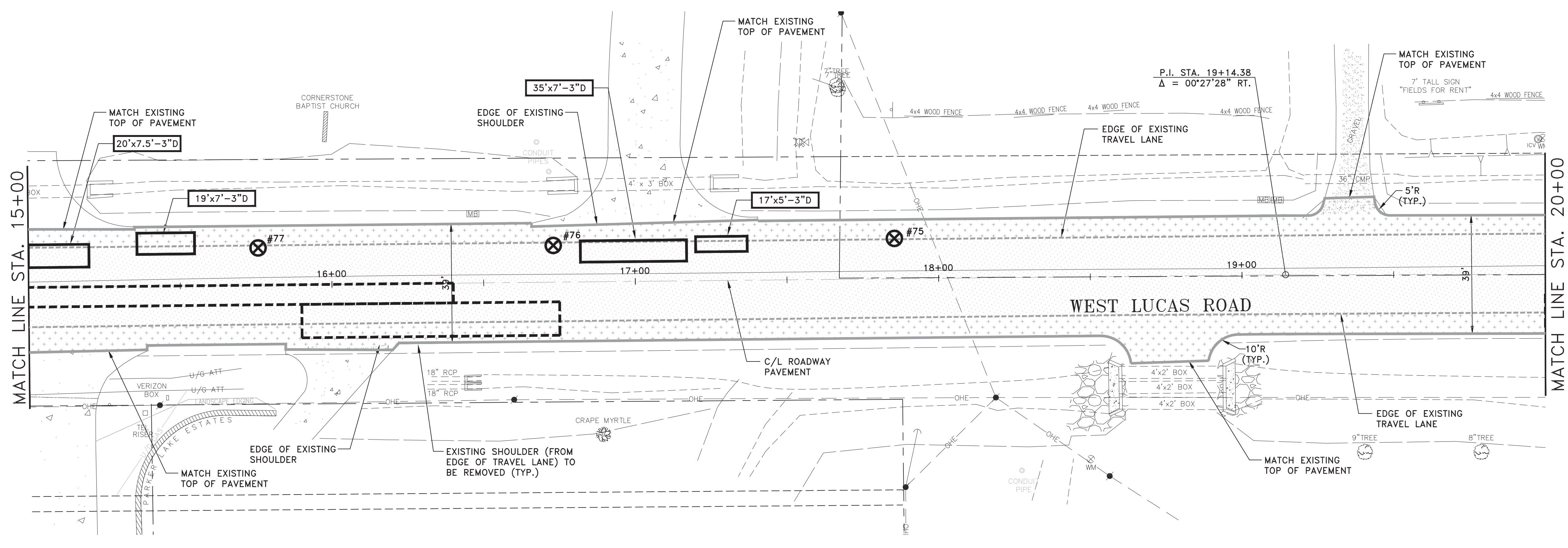


**!! CAUTION !!**

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- LEGEND:**
- OVERLAY - 1-1/2" TYPE 'D' HMAC SURFACE COURSE
  - REMOVE EXISTING PAVEMENT AND CONSTRUCT NEW PAVEMENT SECTION
  - FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY
  - ADDITIONAL PATCHES
  - ADDITIONAL MILL AND REPLACEMENT
  - CORE W/TYPE 'D' OVERLAY MORE THAN OR EQUAL TO 1.5"
  - CORE W/TYPE 'D' OVERLAY LESS THAN 1.5"

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BW2 Engineers, Inc.  
1919 S. SHILOH ROAD, SUITE 500  
GARLAND, TEXAS 75042  
(972) 864-8200  
RECORD DRAWINGS PREPARED ON:  
10/01/2018

6			
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1	7/7/17	REVISED FULL DEPTH ASPHALT REPAIR LIMITS PER FIELD CHANGE	JFW
NO.	DATE	REVISION	REVIEWED

DRAWN: BW2  
DESIGN: JFW  
REVIEWED: MRB  
SCALE: 1" = 20'  
DATE: APRIL 2017  
DWG. NAME: 1623PAVPLN02



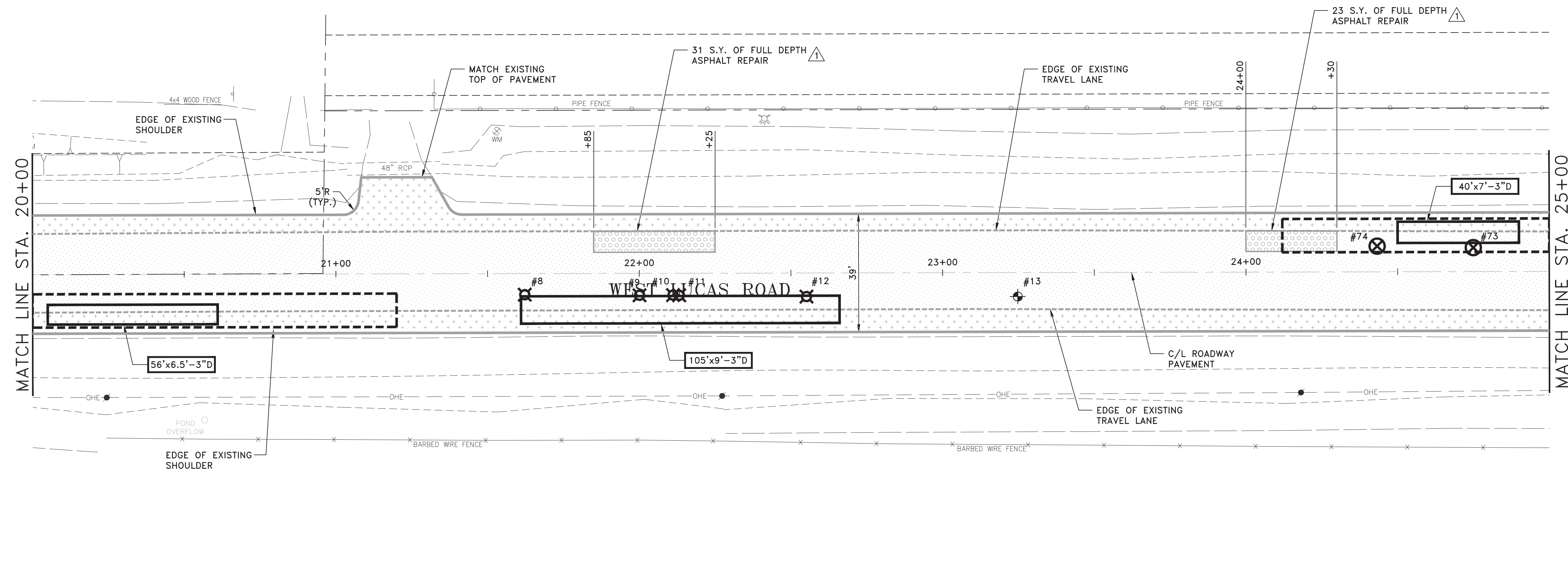
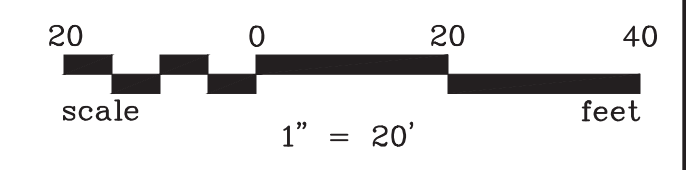
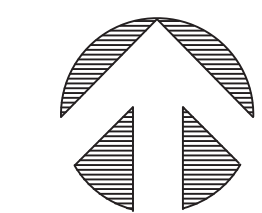
**BW2 ENGINEERS, INC.**  
1919 S. Shiloh Road  
Suite 500, L.B. 27  
Garland, Texas 75042  
(972) 864-8200 (T) (972) 864-8220 (F)  
Firm Registration No. F-5290

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**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
ADD ALT. PAVING PLAN - STA. 10+00 TO STA. 20+00  
SHEET 2 OF 3  
**CITY OF LUCAS**

SHEET NO. 27  
OF 51 SHEETS  
JOB NO. 13-1623



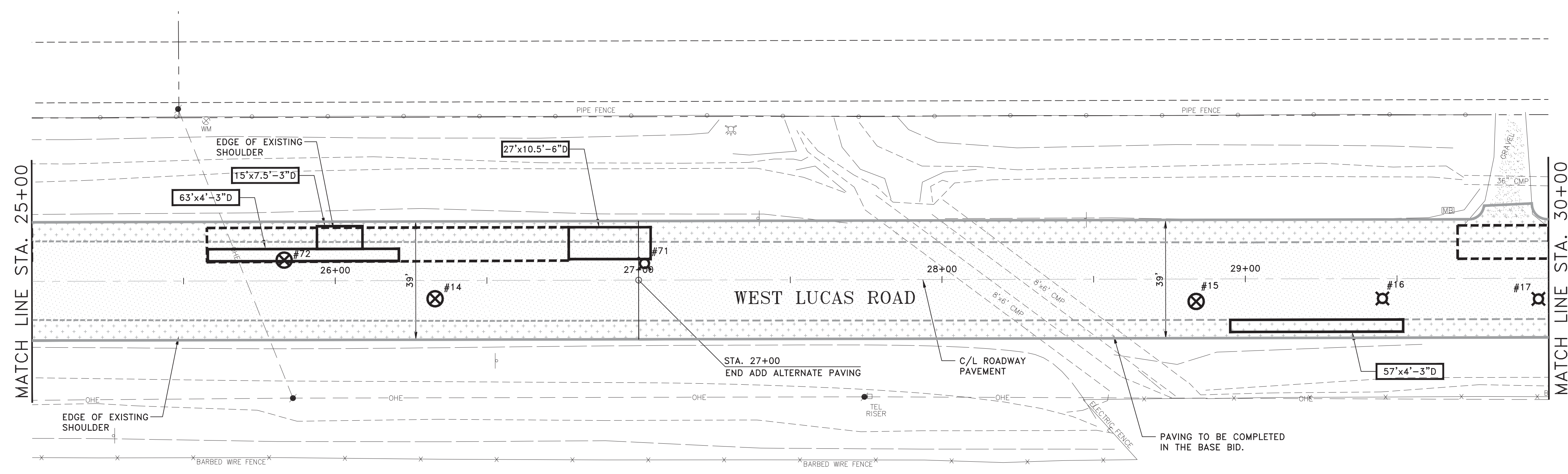


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- OVERLAY - 1-1/2" TYPE 'D' HMAC SURFACE COURSE
  - REMOVE EXISTING PAVEMENT AND CONSTRUCT NEW PAVEMENT SECTION
  - FULL-DEPTH ASPHALT REPAIR WITH HMAC OVERLAY
  - ADDITIONAL PATCHES
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  - CORE W/TYPE 'D' OVERLAY MORE THAN OR EQUAL TO 1.5"
  - CORE W/TYPE 'D' OVERLAY LESS THAN 1.5"

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 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

6			
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1	7/7/17	REVISED FULL DEPTH ASPHALT REPAIR LIMITS PER FIELD CHANGE	JFW
NO.	DATE	REVISION	REVIEWED

DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: 1623PAVPLN03-ALT



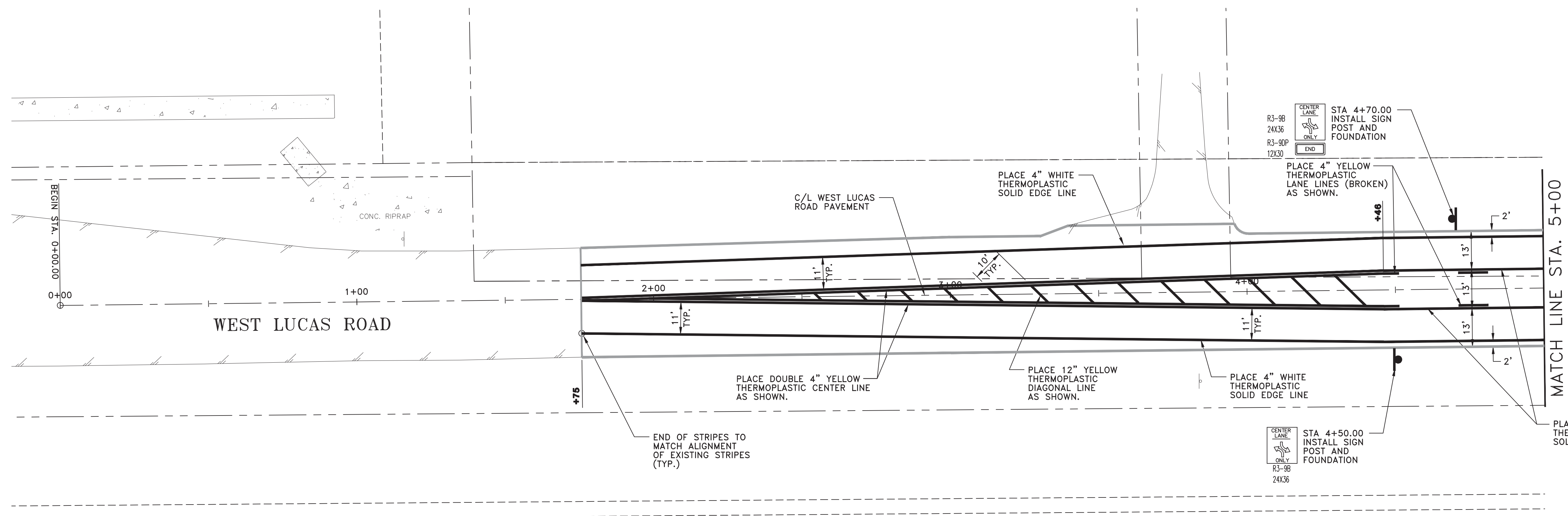
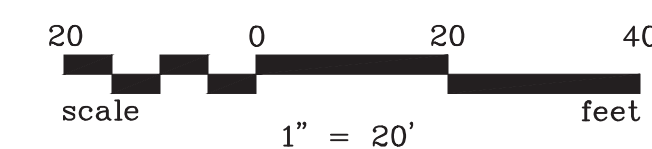
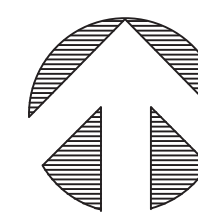
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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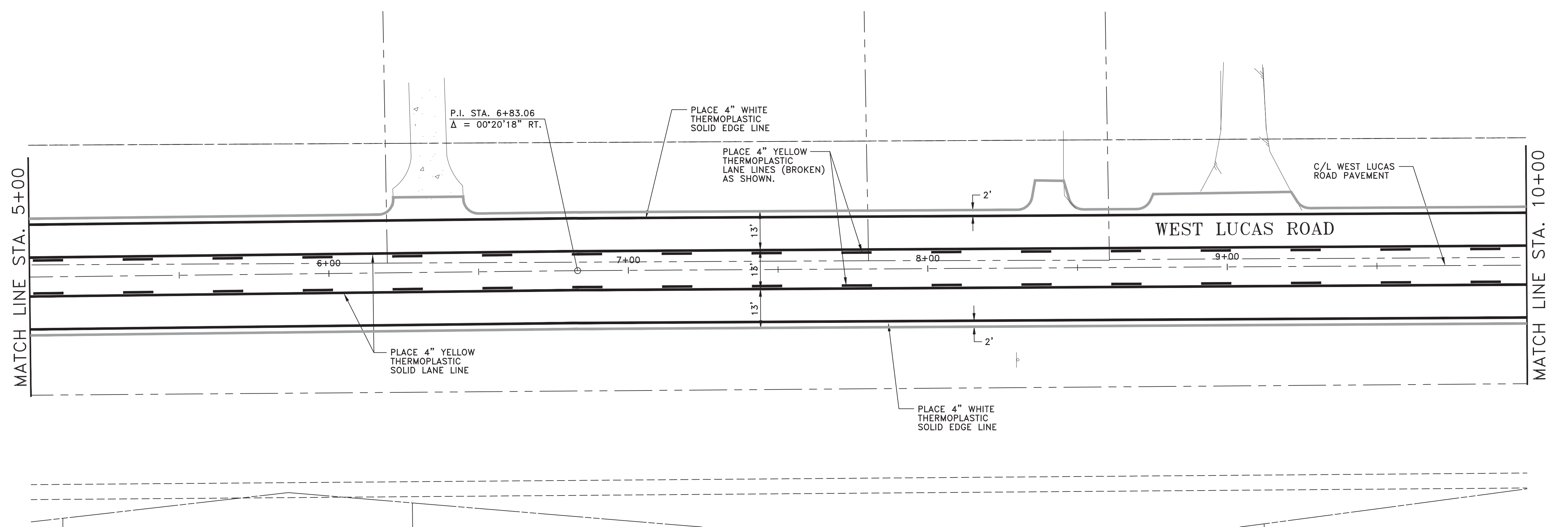
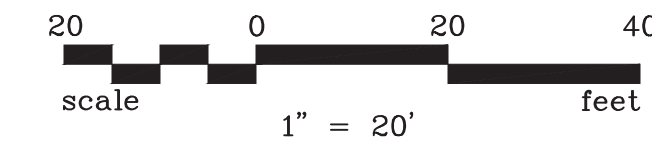
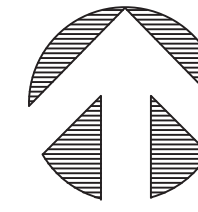
**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 ADD ALT. PAVING PLAN - STA. 20+00 TO STA.30+00**  
 SHEET 3 OF 3  
**CITY OF LUCAS**

SHEET NO. 28  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
 1. SIGN POST SHALL BE SCH. 80 PIPE WITH SLIPBASE TYPE ANCHOR AND CONCRETE FOUNDATION. SEE TxDOT STD. DETAILS SMD (GEN)-08 AND SMD (SLIP 1-3)-08



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 BW2 Engineers, Inc.  
 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

NO.	DATE	REVISION	REVIEWED
6			
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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 40'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623STRIP01



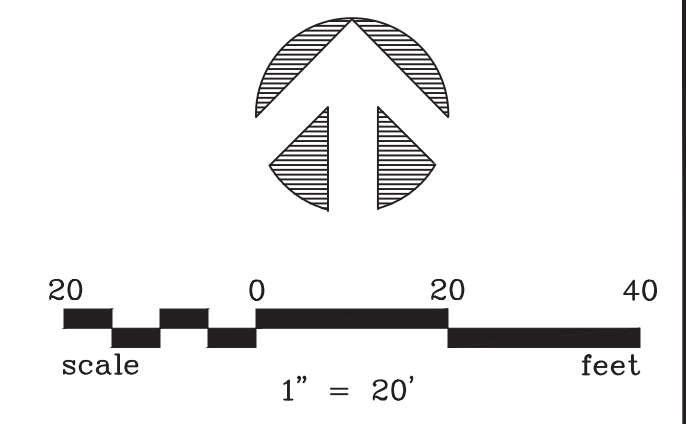
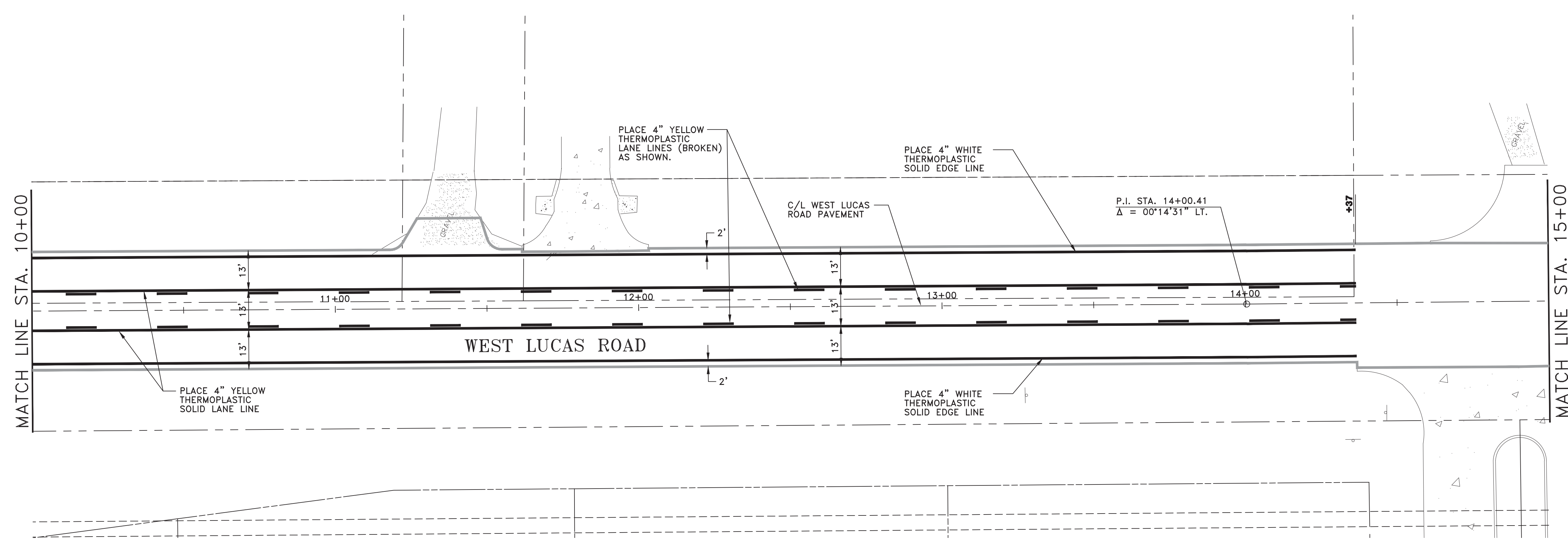
**BW2 ENGINEERS, INC.**  
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 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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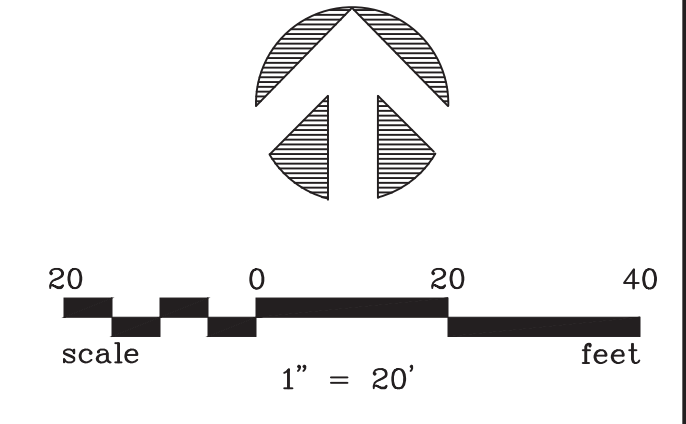
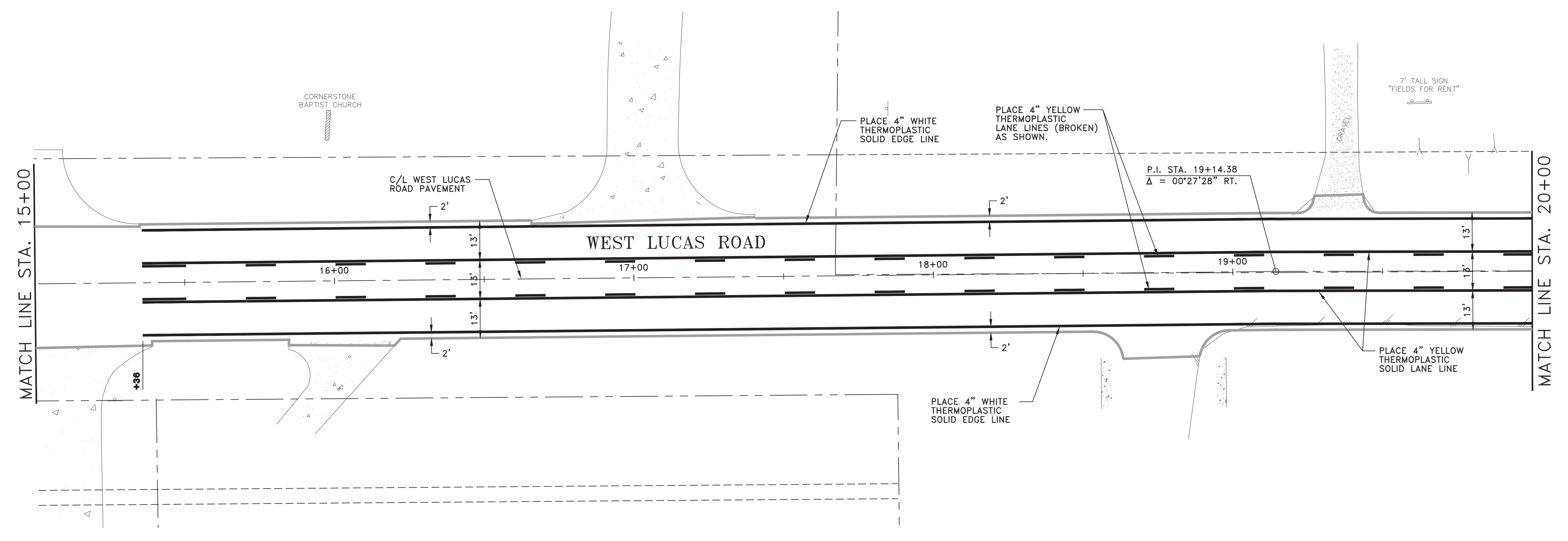
**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 ADD ALT. STRIPING PLAN - SHEET 1 OF 3  
 CITY OF LUCAS**

SHEET NO. 29  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
 1. SIGN POST SHALL BE SCH. 80 PIPE WITH SLIPBASE TYPE ANCHOR AND CONCRETE FOUNDATION. SEE TxDOT STD. DETAILS SMD (GEN)-08 AND SMD (SLIP 1-3)-08



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 BW2 Engineers, Inc.  
 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

NO.	DATE	REVISION	REVIEWED
6			
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4			
3			
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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: \_\_\_\_\_ 1623STRIPE02



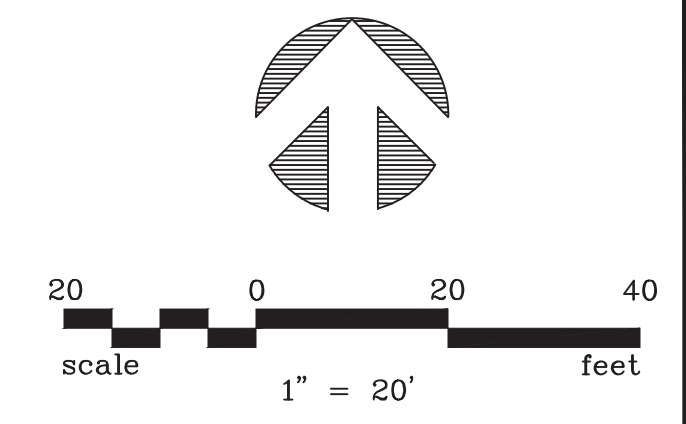
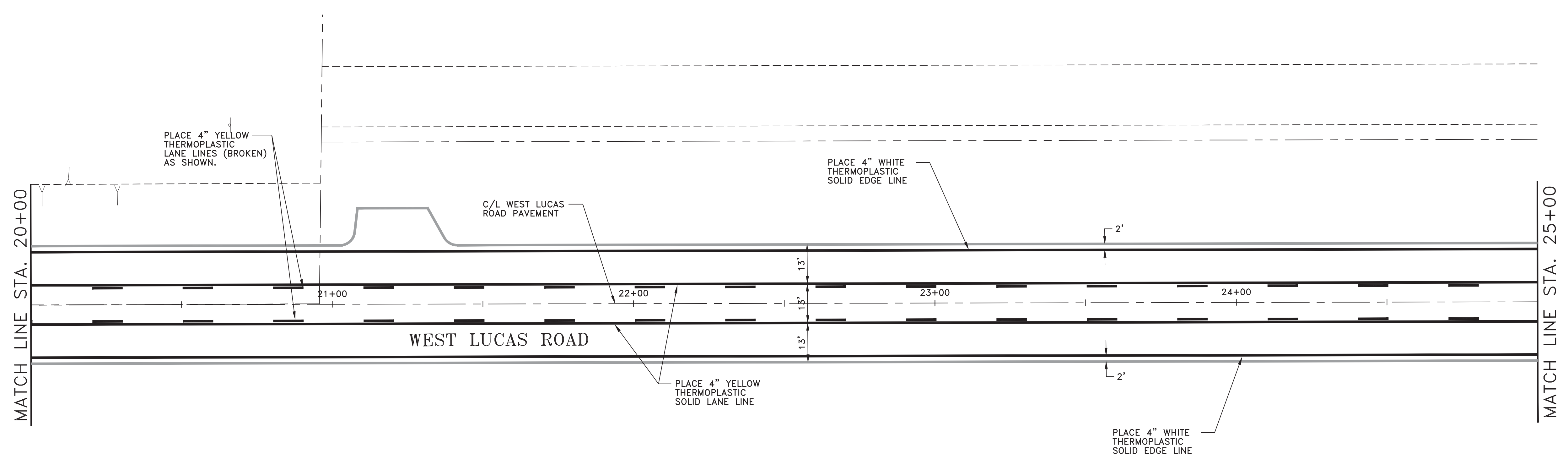
**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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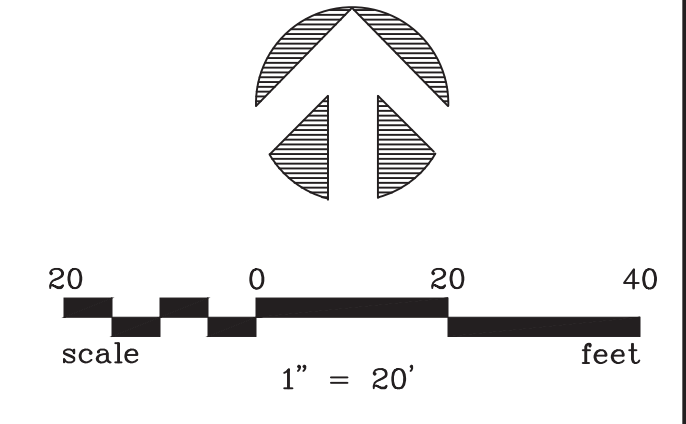
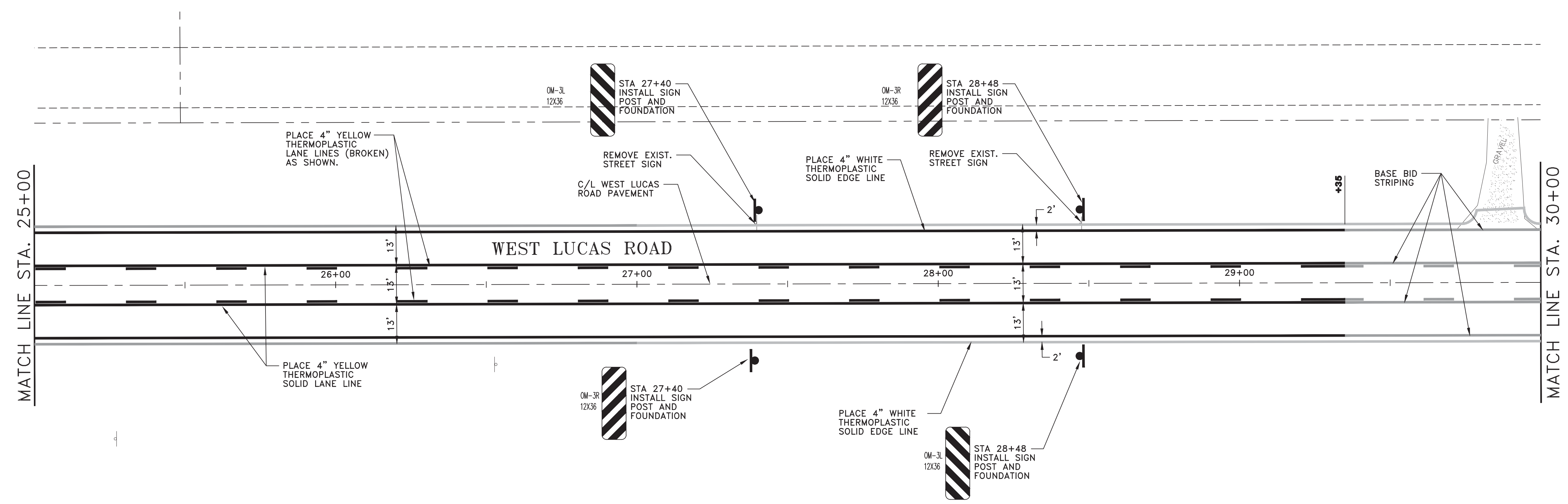
**WIDENING AND OVERLAY PROJECT**  
**WEST LUCAS ROAD**  
 ADD ALT. STRIPING PLAN - SHEET 2 OF 3  
**CITY OF LUCAS**

SHEET NO. 30  
 OF 51 SHEETS  
 JOB NO. 13-1623





**NOTE:**  
 1. SIGN POST SHALL BE SCH. 80 PIPE WITH SLIPBASE TYPE ANCHOR AND CONCRETE FOUNDATION. SEE TxDOT STD. DETAILS SMD (GEN)-08 AND SMD (SLIP 1-3)-08



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 BW2 Engineers, Inc.  
 1919 S. SHILOH ROAD, SUITE 500  
 GARLAND, TEXAS 75042  
 (972) 864-8200  
 RECORD DRAWINGS PREPARED ON:  
 10/01/2018

NO.	DATE	REVISION	REVIEWED
6			
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4			
3			
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DRAWN: \_\_\_\_\_ BW2  
 DESIGN: \_\_\_\_\_ JFW  
 REVIEWED: \_\_\_\_\_ MRB  
 SCALE: \_\_\_\_\_ 1" = 20'  
 DATE: \_\_\_\_\_ APRIL 2017  
 DWG. NAME: 1623STRIP03-ALT



**BW2 ENGINEERS, INC.**  
 1919 S. Shiloh Road  
 Suite 500, L.B. 27  
 Garland, Texas 75042  
 (972) 864-8200 (T) (972) 864-8220 (F)  
 Firm Registration No. F-5290

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**WIDENING AND OVERLAY PROJECT  
 WEST LUCAS ROAD  
 ADD ALT. STRIPING PLAN - SHEET 3 OF 3  
 CITY OF LUCAS**

SHEET NO. 31  
 OF 51 SHEETS  
 JOB NO. 13-1623



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

## SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

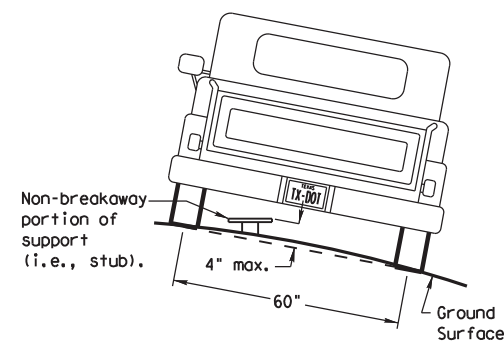
SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

**Post Type**  
 FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))  
 TWT = Thin-Walled Tubing (see SMD(TWT))  
 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))  
 S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

**Number of Posts (1 or 2)**  
**Anchor Type**  
 UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))  
 UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))  
 WS = Wedge Anchor Steel - (see SMD(TWT))  
 WP = Wedge Anchor Plastic (see SMD(TWT))  
 SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))  
 SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

**Sign Mounting Designation**  
 P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))  
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))  
 IF REQUIRED  
 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))  
 WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))  
 EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

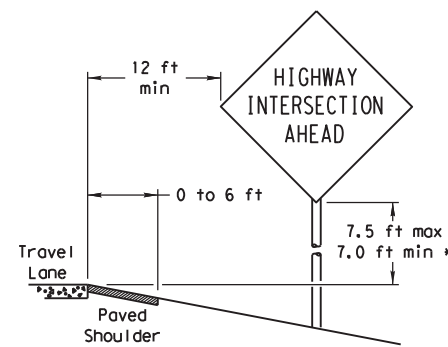
## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

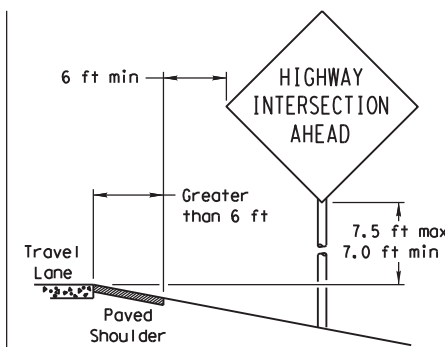
## SIGN LOCATION

### PAVED SHOULDERS



#### LESS THAN 6 FT. WIDE

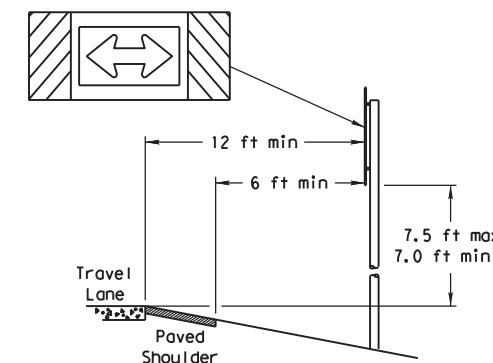
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



#### GREATER THAN 6 FT. WIDE

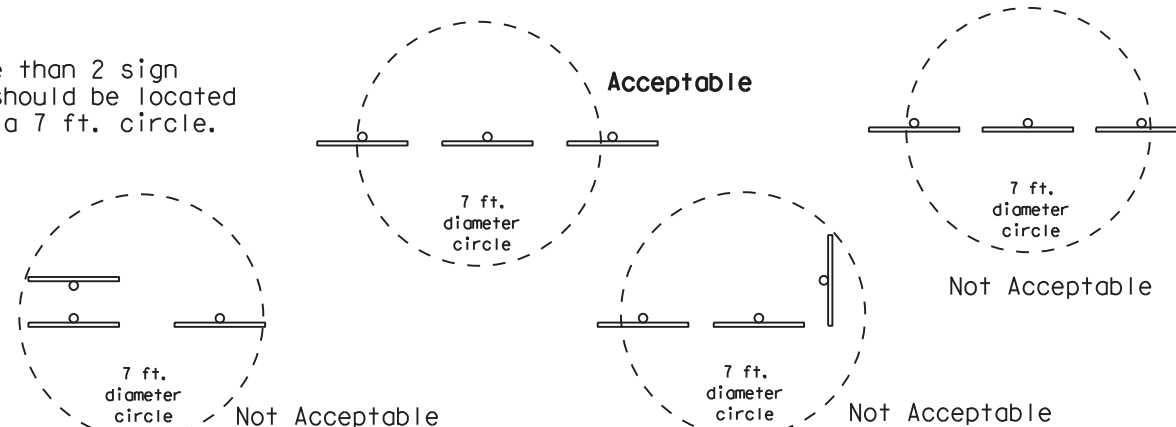
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

### T-INTERSECTION

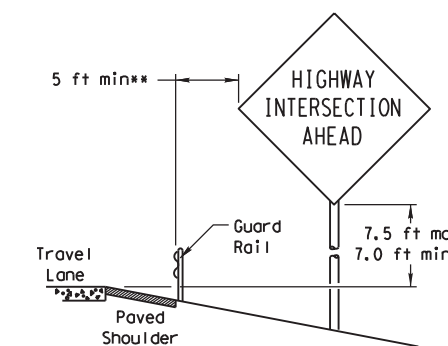


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

No more than 2 sign posts should be located within a 7 ft. circle.

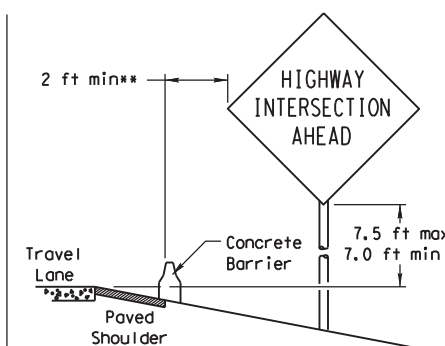


### BEHIND BARRIER



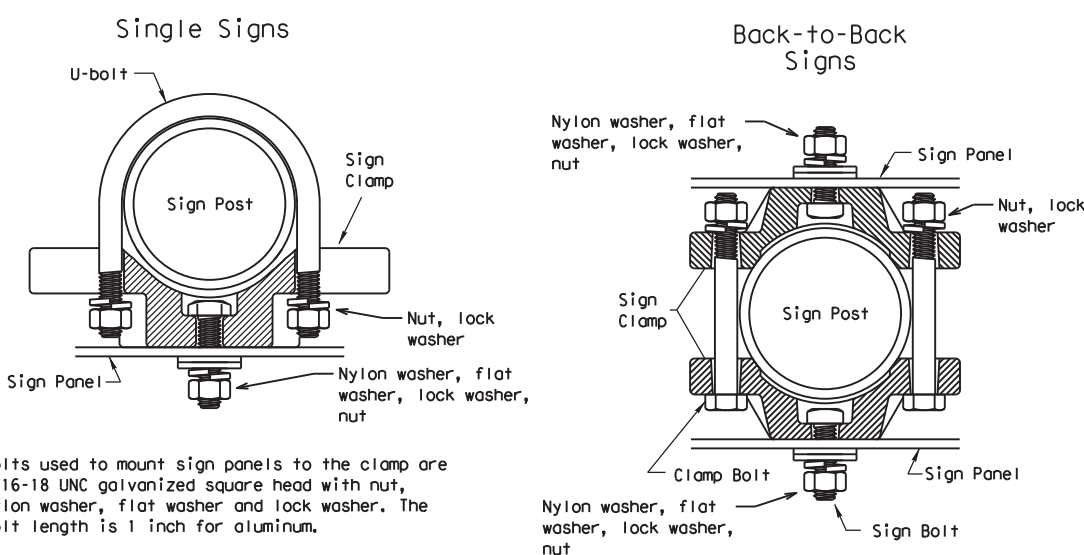
#### BEHIND GUARDRAIL

\*\*Sign clearance based on distance required for proper guard rail or concrete barrier performance.



#### BEHIND CONCRETE BARRIER

## TYPICAL SIGN ATTACHMENT DETAIL



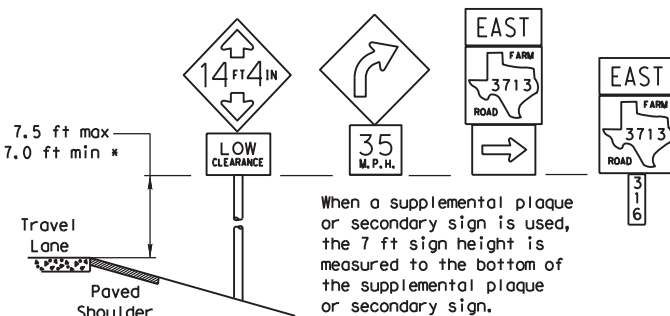
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

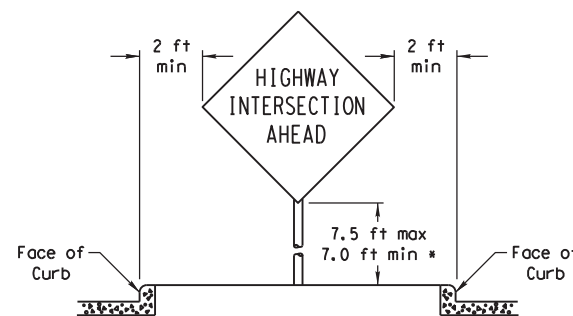
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

### SIGNS WITH PLAQUES

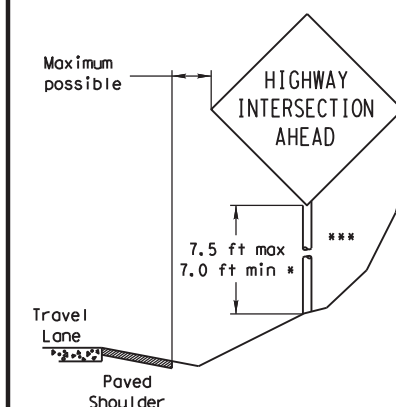


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

### CURB & GUTTER OR RAISED ISLAND



### RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

\*\*\* Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

\* Signs shall be mounted using the following condition that results in the greatest sign elevation:

- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:  
<http://www.txdot.gov/publications/traffic.htm>

Texas Department of Transportation  
 Traffic Operations Division

## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD (GEN) - 08

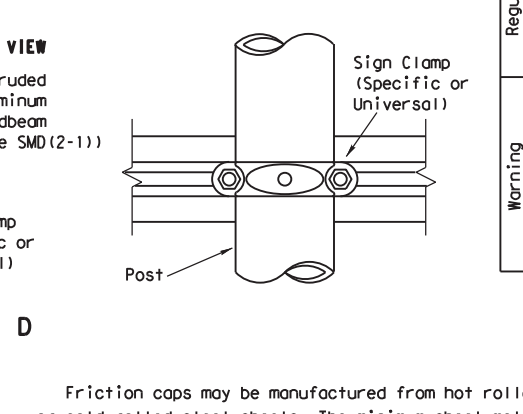
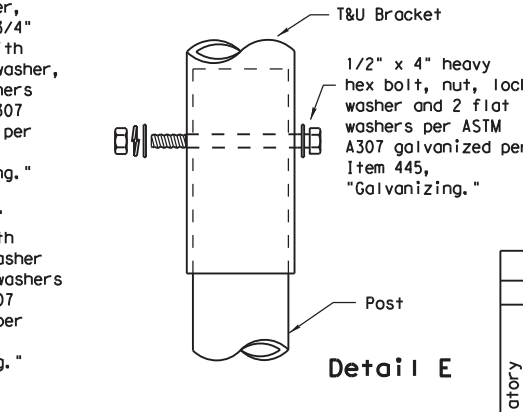
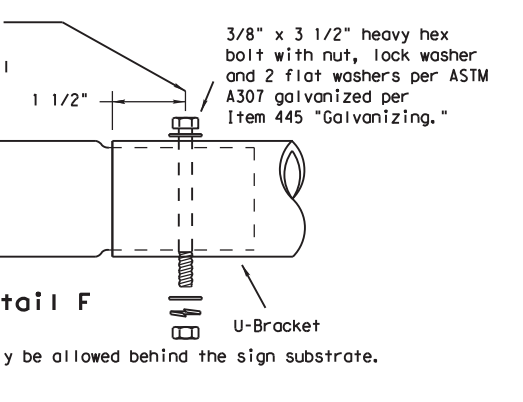
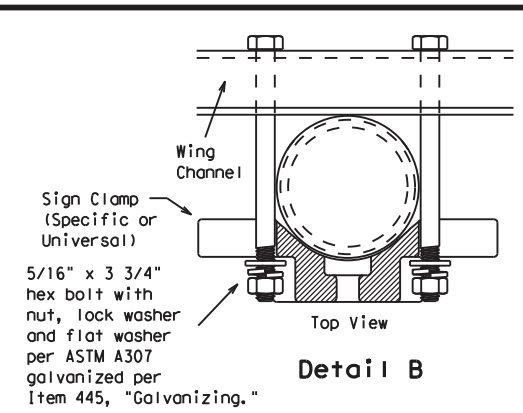
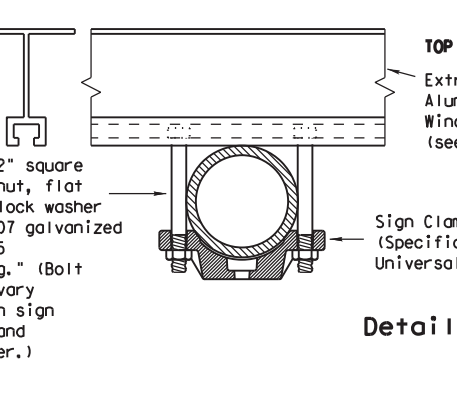
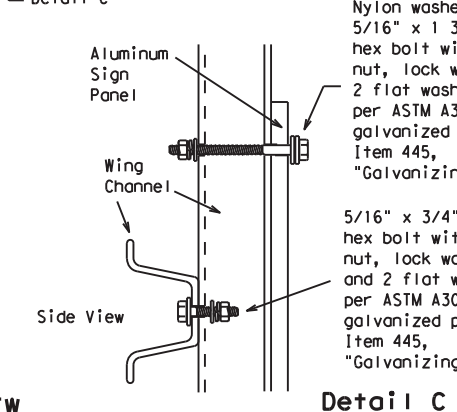
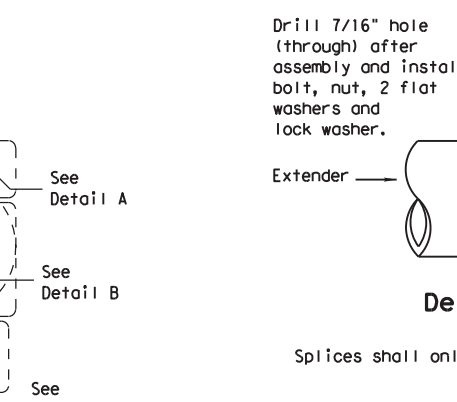
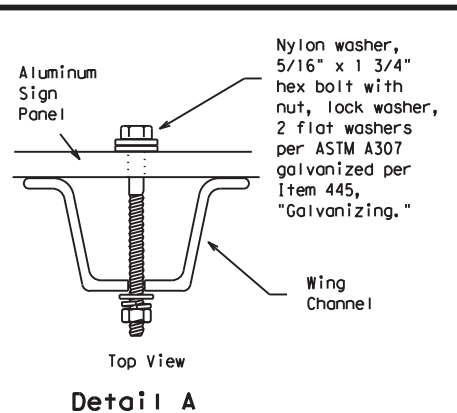
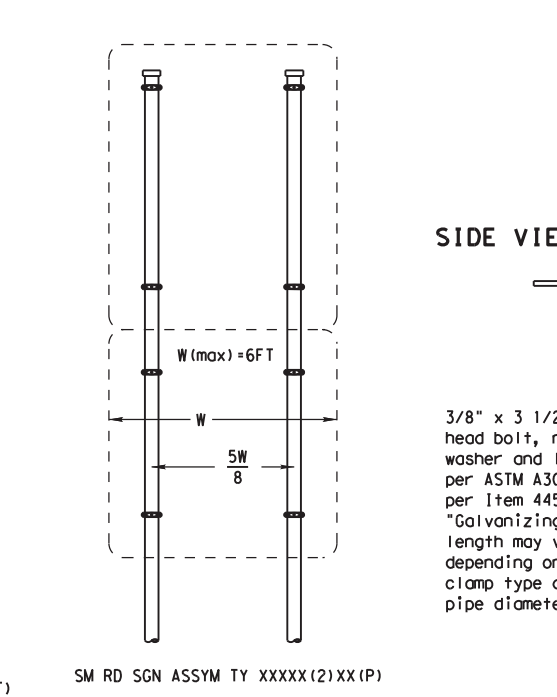
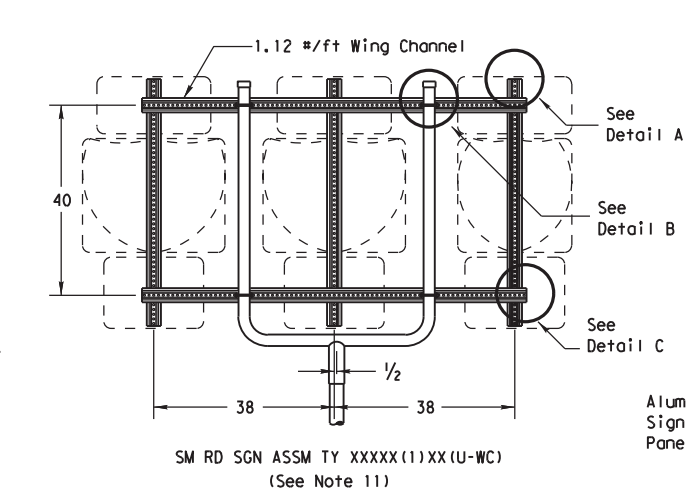
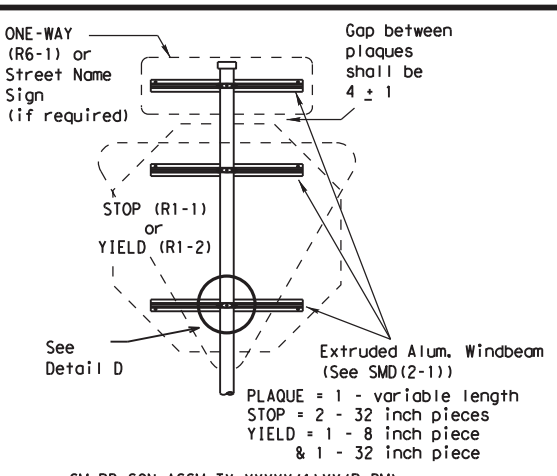
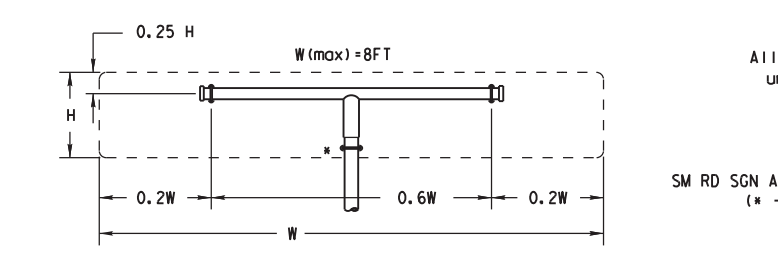
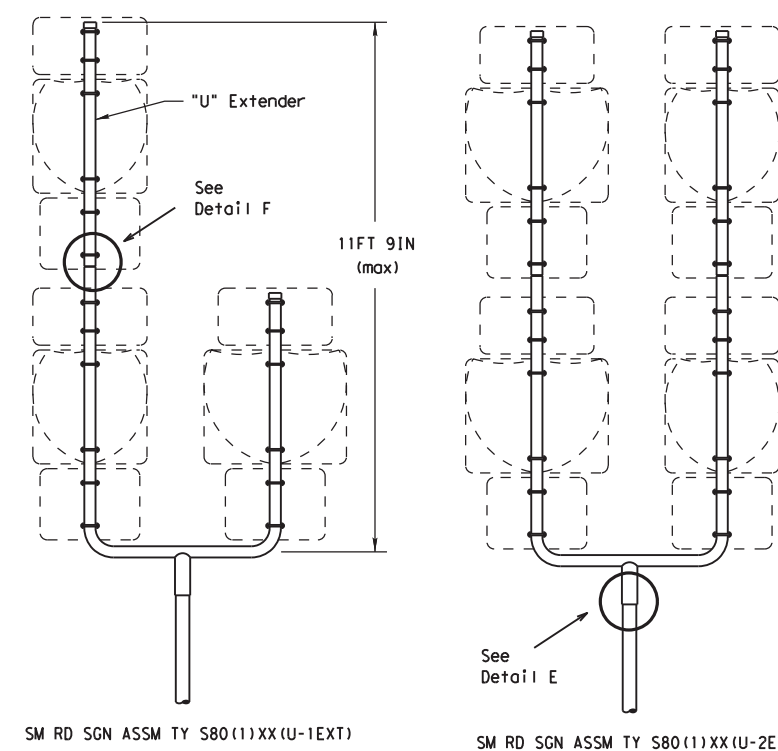
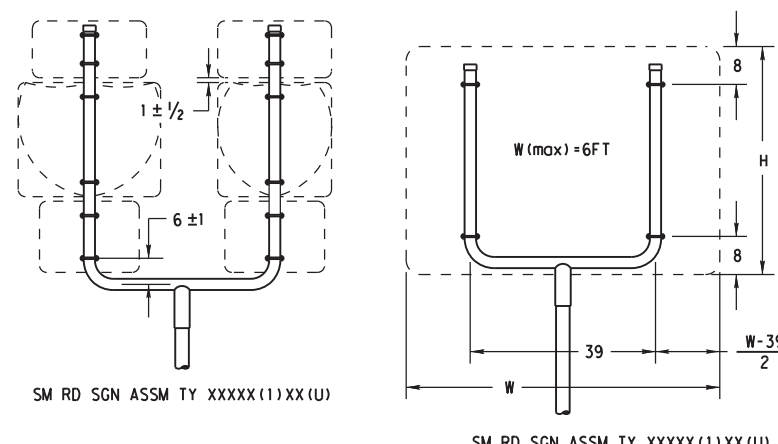
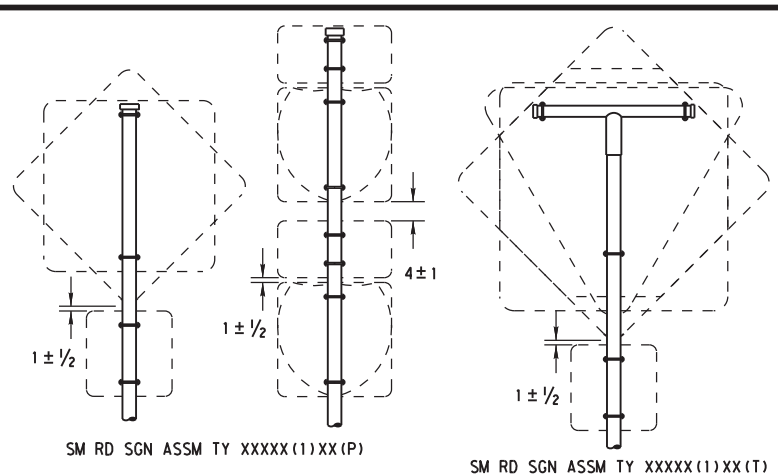
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9-08	REVISIONS	CONT	SECT	JOB
				HIGHWAY
		DIST	COUNTY	SHEET NO.







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GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG       | 1          | 16 SF          |
| 10 BWG       | 2          | 32 SF          |
| Sch 80       | 1          | 32 SF          |
| Sch 80       | 2          | 64 SF          |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
- Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.
- Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
SIGN DESCRIPTION	SUPPORT	
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
Warning	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)	
Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)	



**SIGN MOUNTING DETAILS  
SMALL ROADSIDE SIGNS  
TRIANGULAR SLIPBASE SYSTEM  
SMD(SLIP-2)-08**

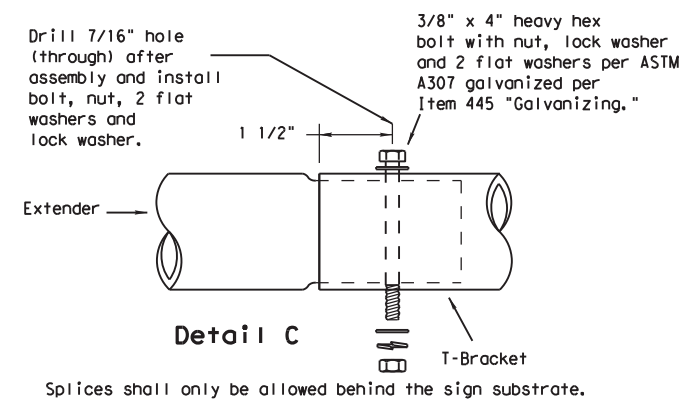
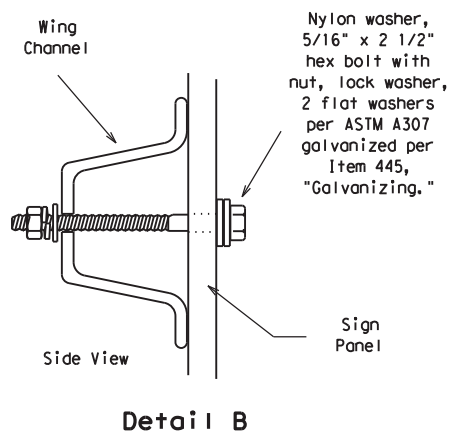
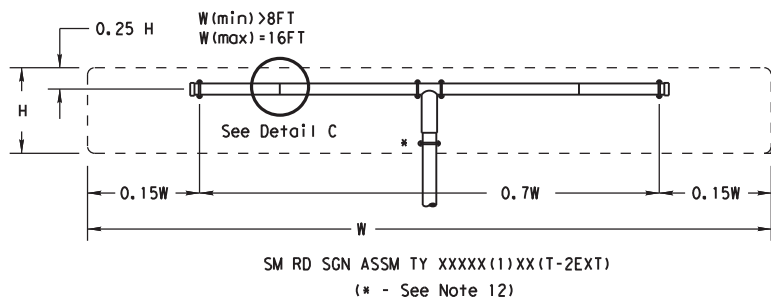
Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes. The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture. Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

DATE:  
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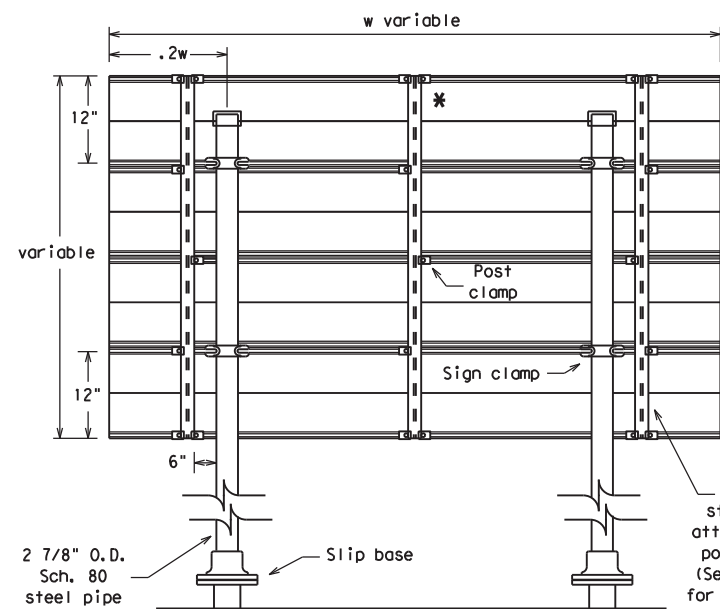
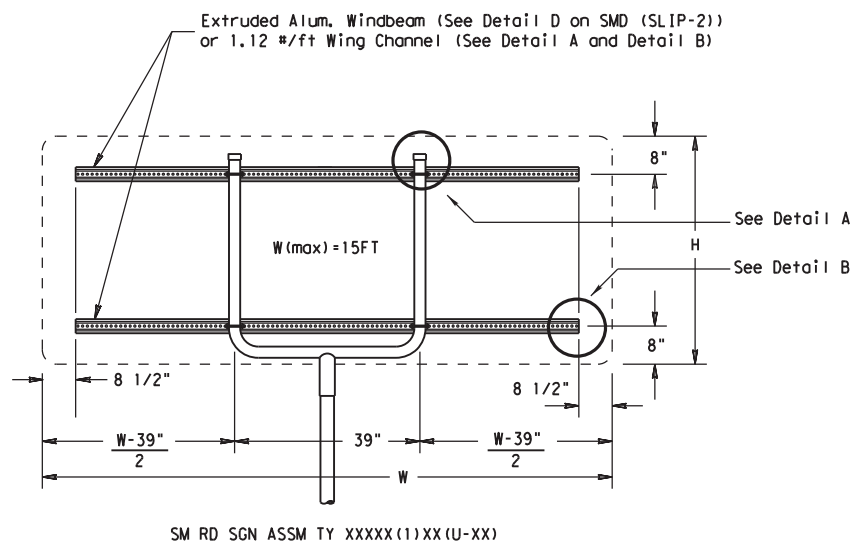
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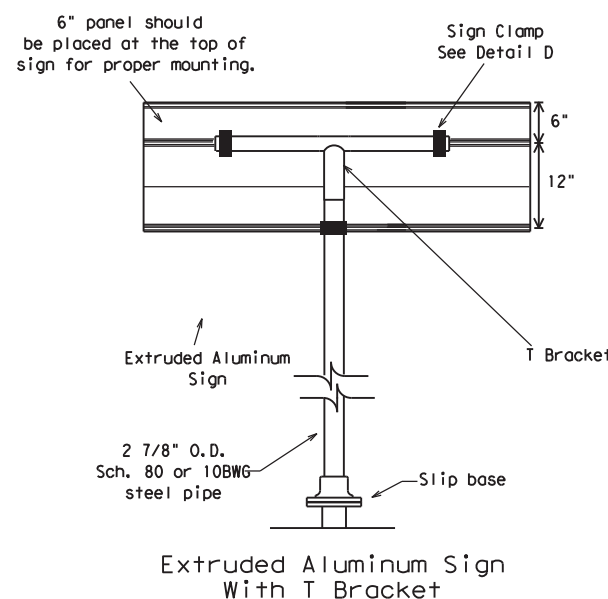
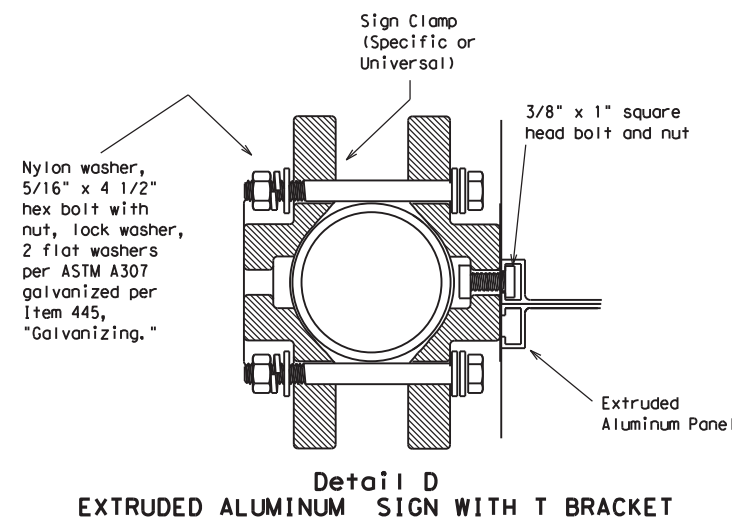
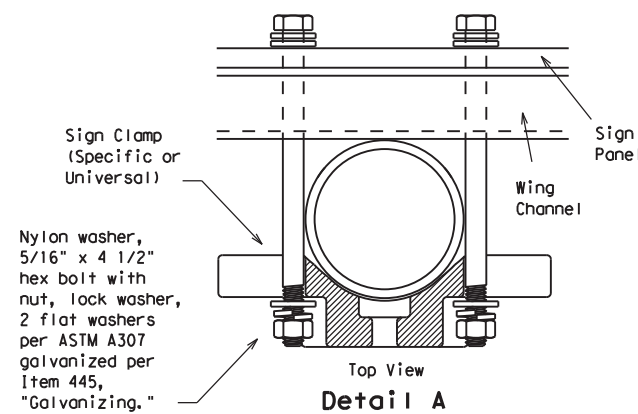
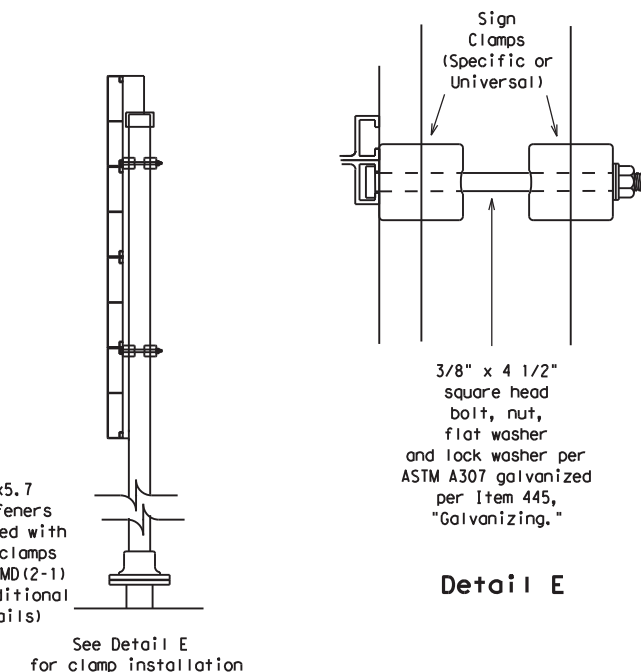


GENERAL NOTES:

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- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.



\* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Use Extruded Alum. Windbeam as stiffeners See SMD (2-1) for additional details  
See Detail E for clamp installation

		REQUIRED SUPPORT	
		SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)	
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)	
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)	
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)	
Warning	48x60-inch signs	TY S80(1)XX(T)	
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)	
	48x60-inch signs	TY S80(1)XX(T)	
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)	
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)	
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)	

Texas Department of Transportation  
Traffic Operations Division

SIGN MOUNTING DETAILS  
SMALL ROADSIDE SIGNS  
TRIANGULAR SLIPBASE SYSTEM  
SMD(SLIP-3)-08

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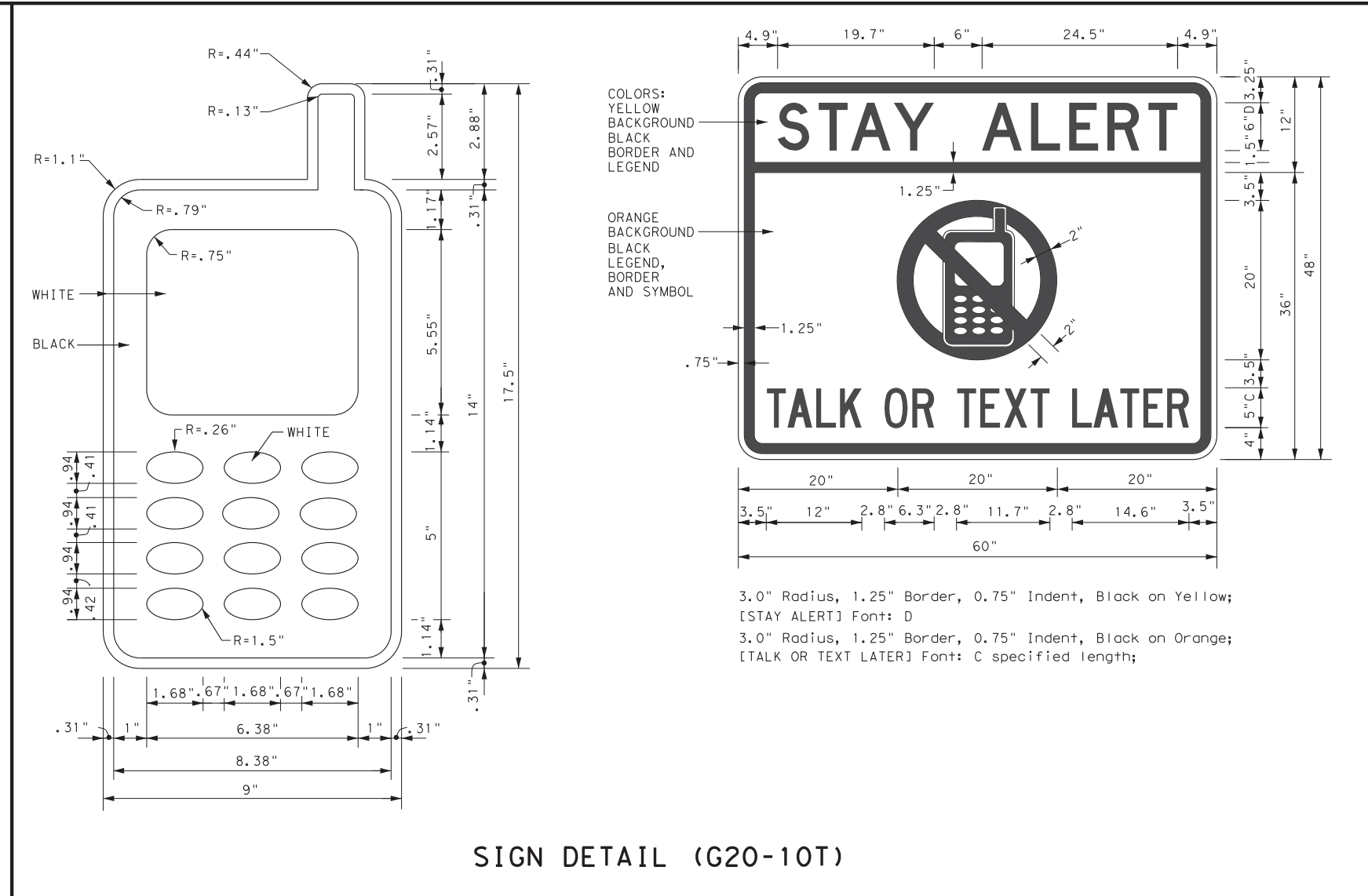
**BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:**

- The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- The Engineer has the final decision on the location of all traffic control devices.
- Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

**WORKER SAFETY APPAREL NOTES:**

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

DATE:  
 FILE:



Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation  
 Traffic Operations Division - TE  
 Phone (512) 416-3118

<b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b> <a href="http://www.txdot.gov">http://www.txdot.gov</a>
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

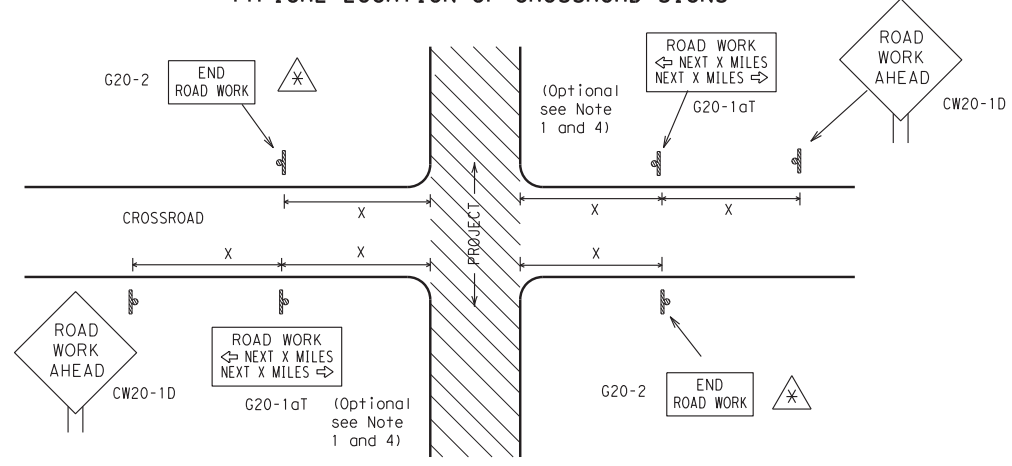
SHEET 1 OF 12

		<i>Traffic Operations Division Standard</i>	
<b>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</b>			
<b>BC (1) - 14</b>			
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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9-07	7-13		
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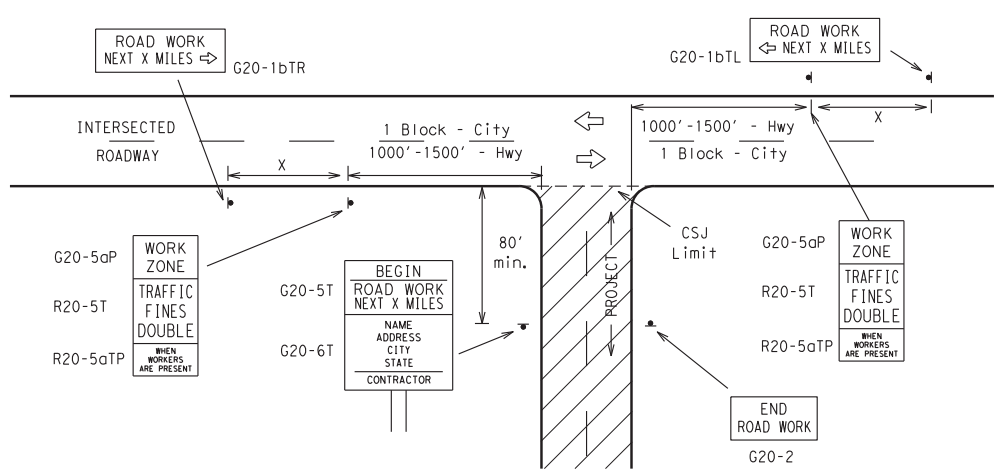
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



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

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

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

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

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

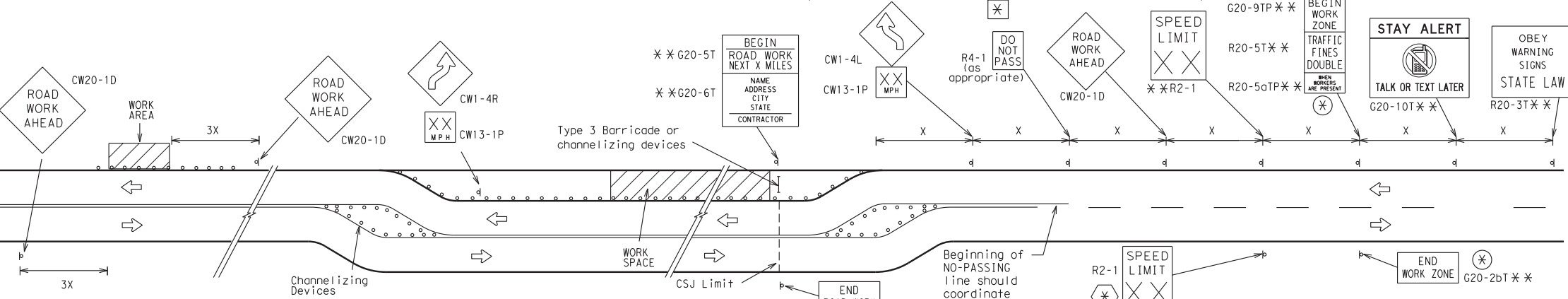
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

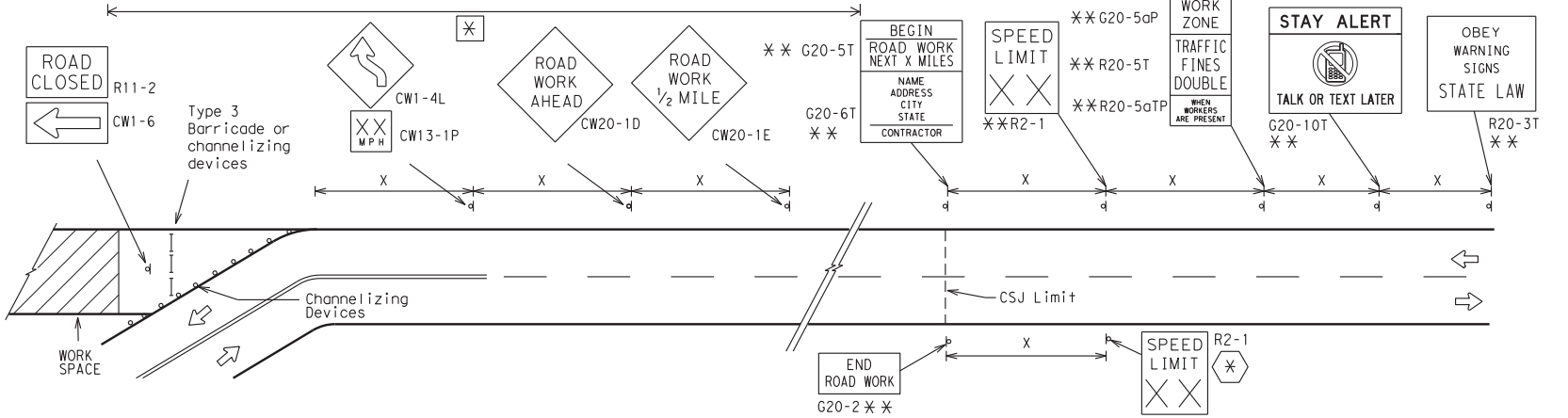
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

**WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS**

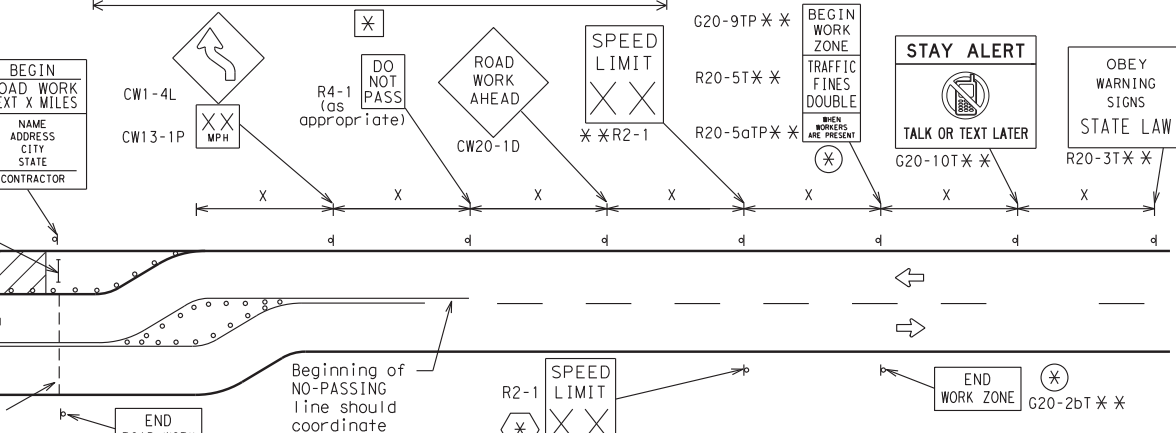


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS**



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



**NOTES**

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- ⊗ The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
- \*\* Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.
- ⊗ Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
- ⊗ Contractor will install a regulatory speed limit sign at the end of the work zone.

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

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**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

**BC(2)-14**

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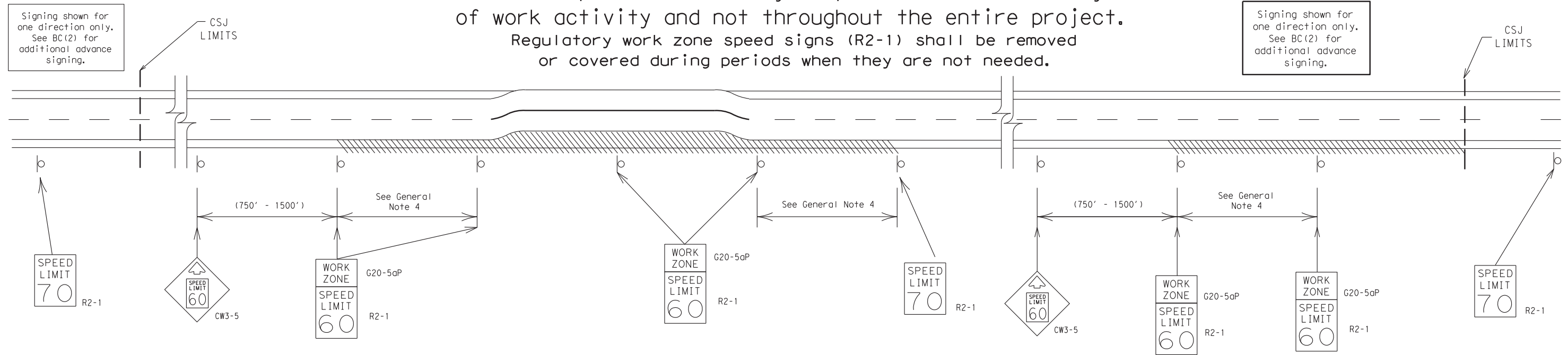
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# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

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

### SHORT TERM WORK ZONE SPEED LIMITS

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

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

## GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- Frequency of work zone speed limit signs should be:
 

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

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SHEET 3 OF 12



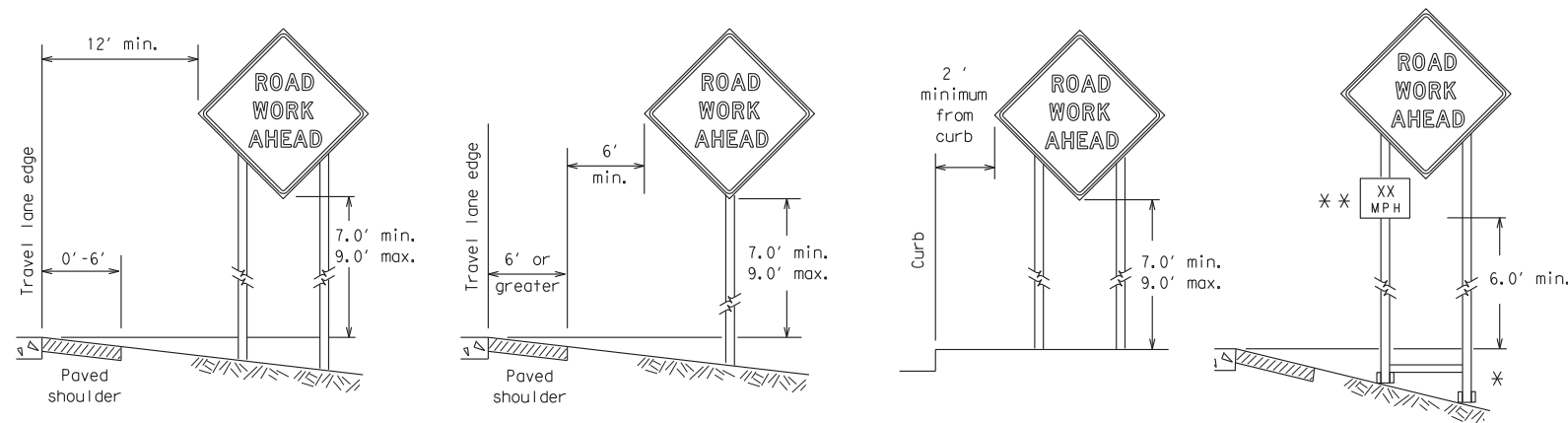
## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 14

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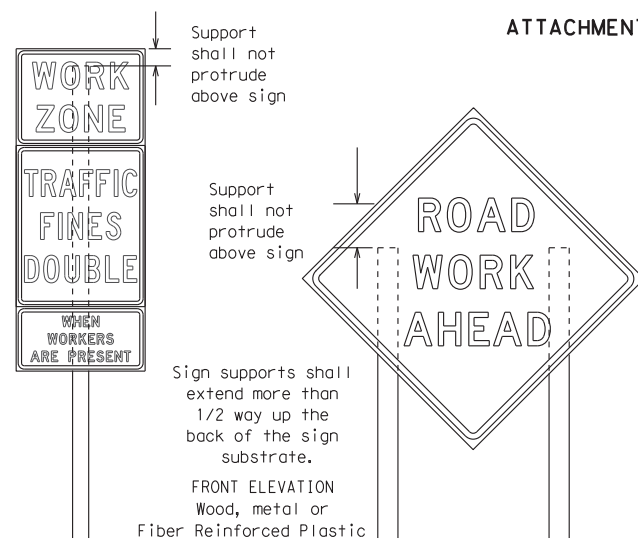
### TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



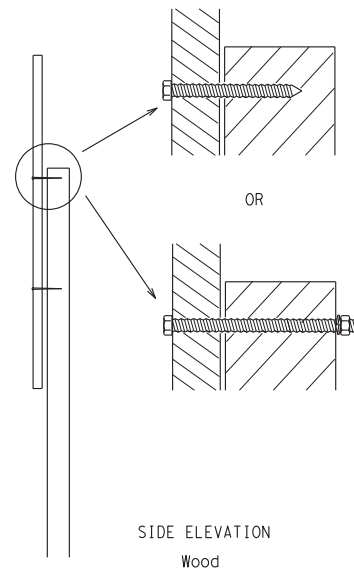
\* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

### ATTACHMENT FOR SIGN SUPPORTS



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

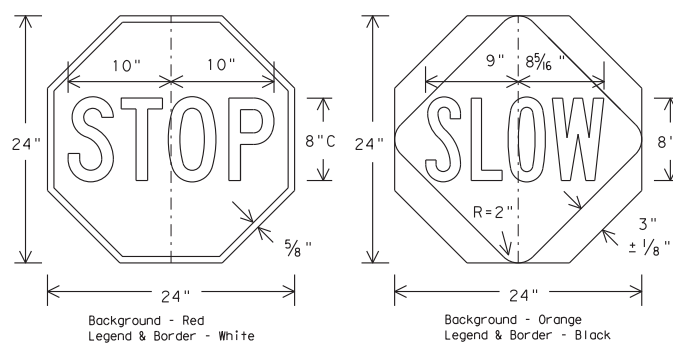


**Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.**

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

### STOP/SLOW PADDLES

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



### CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

### GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
  - Wooden sign posts shall be painted white.
  - Barricades shall NOT be used as sign supports.
  - 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.
  - The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
  - The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
  - 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.
  - 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.
  - 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)**
- The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
    - Long-term stationary - work that occupies a location more than 3 days.
    - 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.
    - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
    - Short, duration - work that occupies a location up to 1 hour.
    - 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.
- The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

### SIZE OF SIGNS

- 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

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

### REFLECTIVE SHEETING

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

### SIGN LETTERS

- 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.
- 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.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

### SIGN SUPPORT WEIGHTS

- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
- 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

### FLAGS ON SIGNS

- 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.

SHEET 4 OF 12



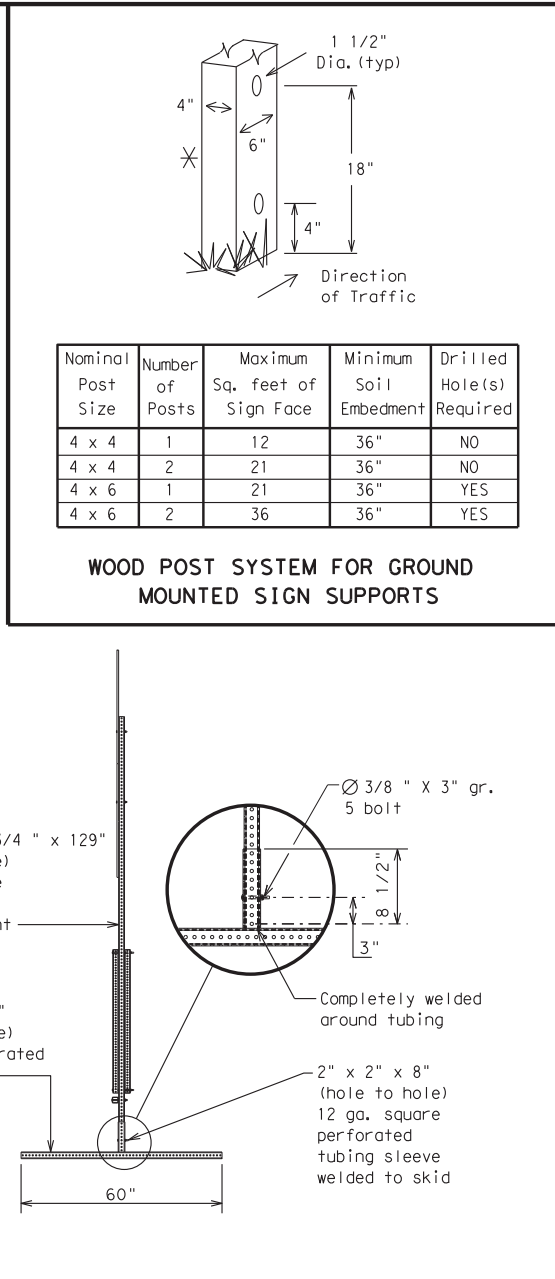
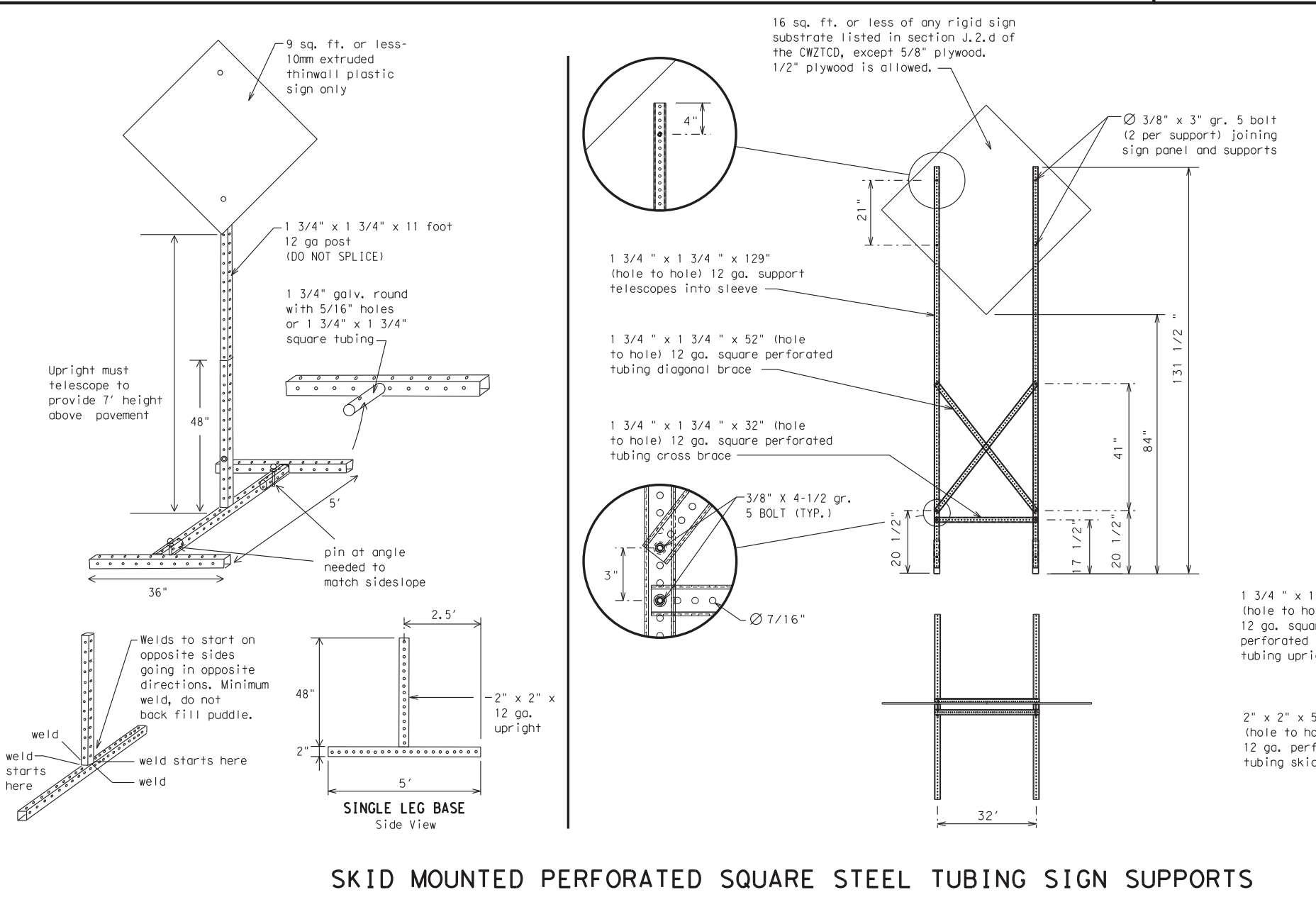
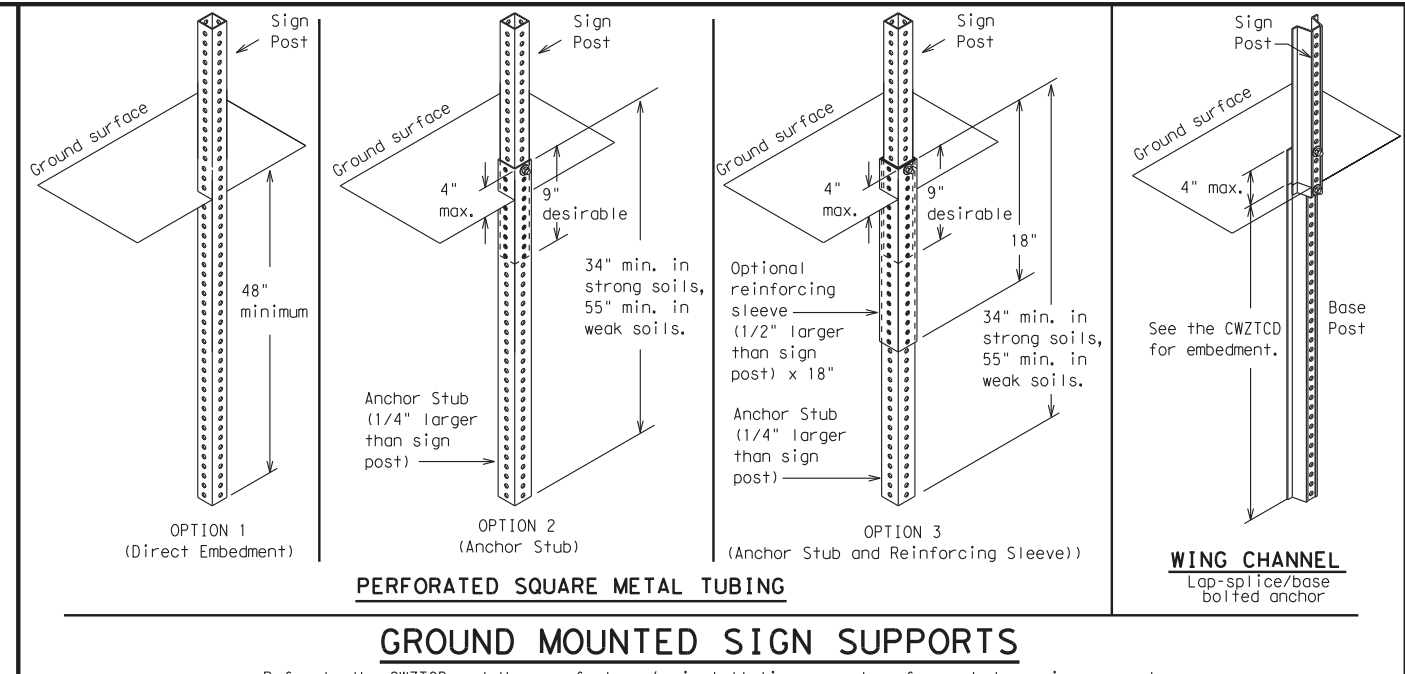
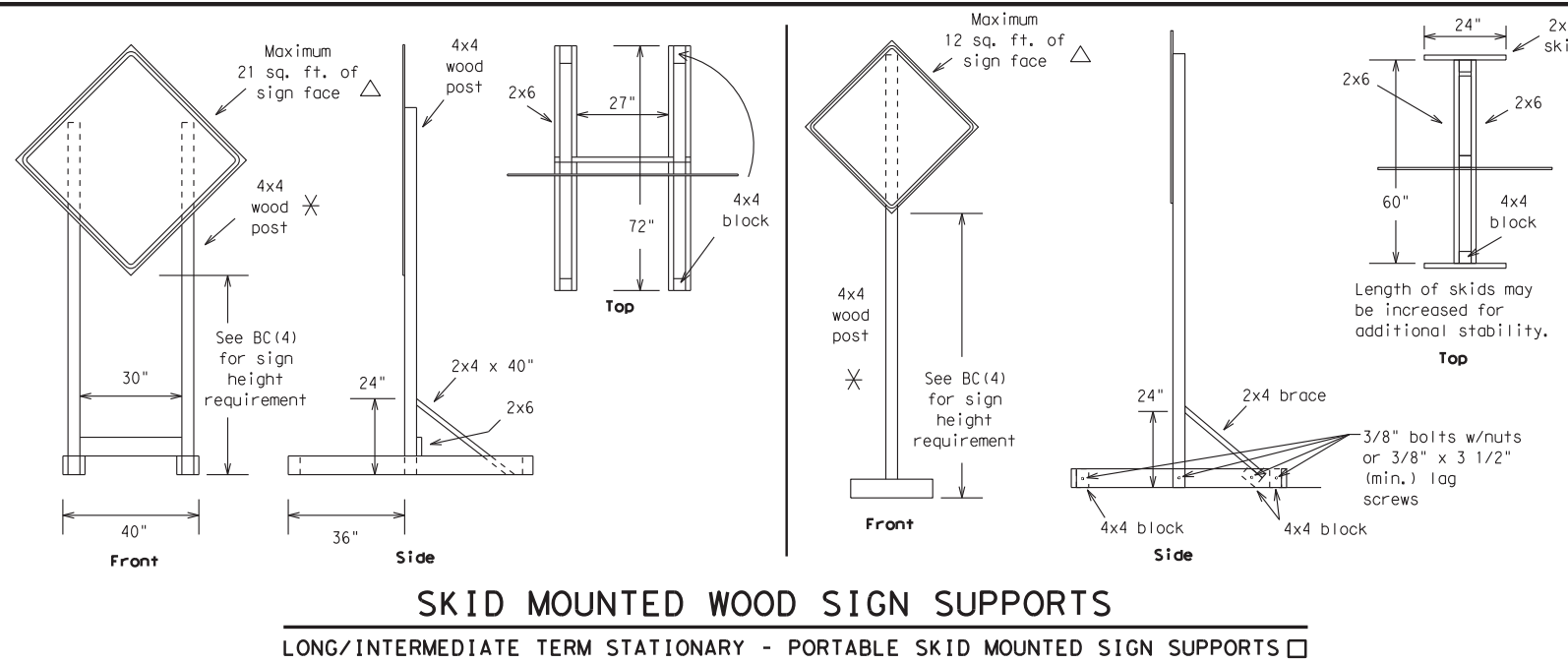
## BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 14

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**WEDGE ANCHORS**  
Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

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

- GENERAL NOTES**
- Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
  - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
  - When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

- See BC(4) for definition of "Work Duration."
- Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

**BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**

**BC(5) - 14**

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

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

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

### Other Condition List

FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *

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

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

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

### Location List

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

### Warning List

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

### \*\* Advance Notice List

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

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

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

## WORDING ALTERNATIVES

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- 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.
- 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.
- A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

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# BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 14

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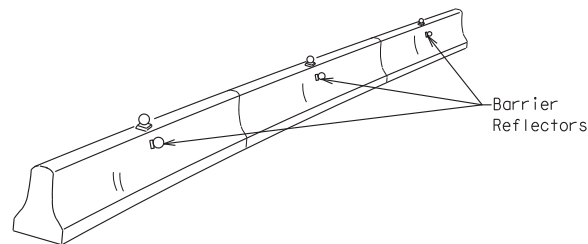
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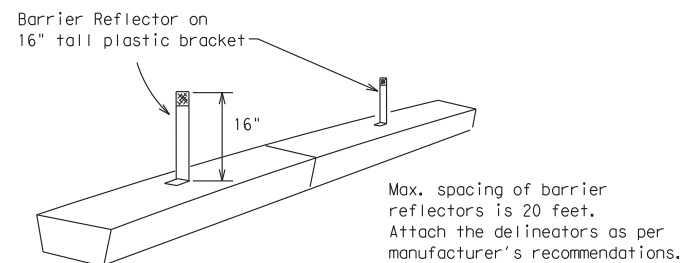
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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

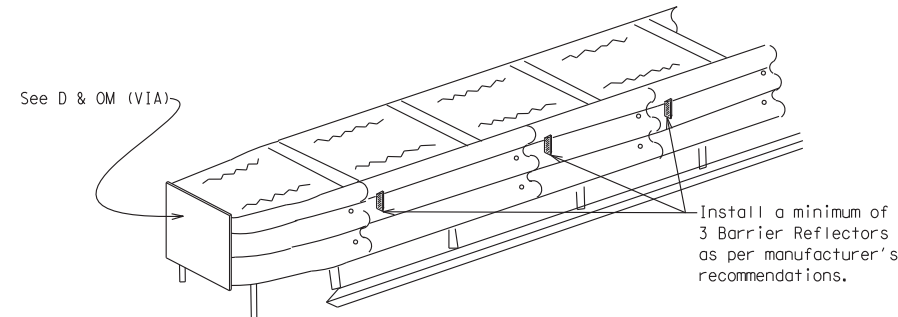


**CONCRETE TRAFFIC BARRIER (CTB)**

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



**LOW PROFILE CONCRETE BARRIER (LPCB)**



**DELINEATION OF END TREATMENTS**

**END TREATMENTS FOR CTB'S USED IN WORK ZONES**  
 End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

**BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS**

**WARNING LIGHTS**

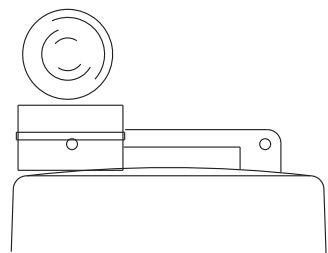
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B<sub>FL</sub> or C<sub>FL</sub> Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
- When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

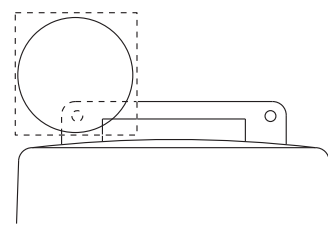
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



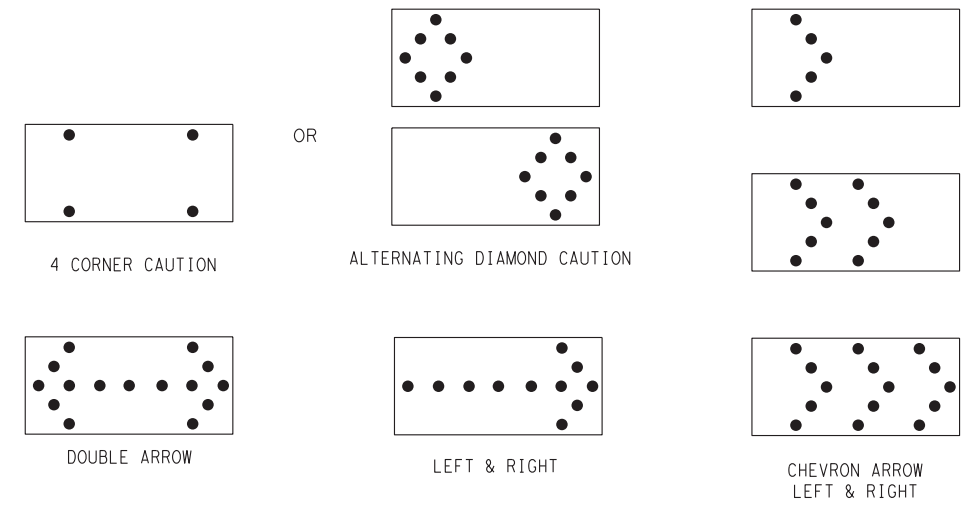
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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

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



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

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

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

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

**FLASHING ARROW BOARDS**

SHEET 7 OF 12

**TRUCK-MOUNTED ATTENUATORS**

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



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

**BC (7) - 14**

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**GENERAL NOTES**

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

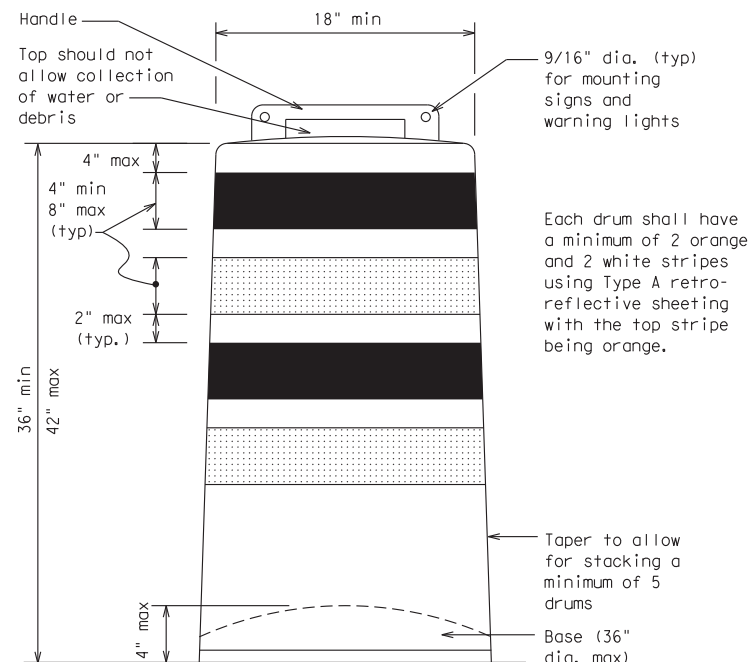
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.
- The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
- 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.
- 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.
- Drum and base shall be marked with manufacturer's name and model number.

**RETROREFLECTIVE SHEETING**

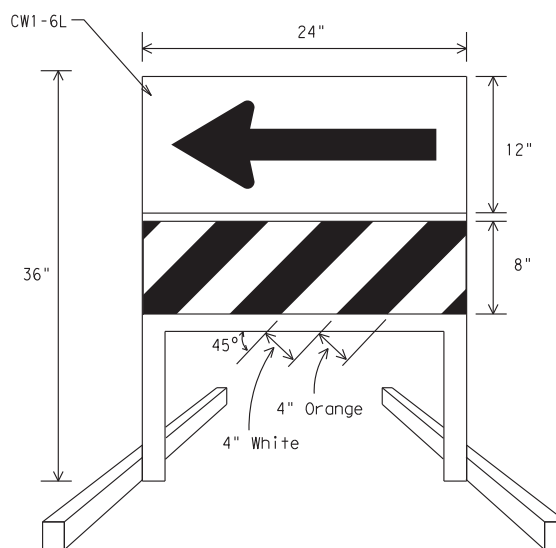
- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall be suitable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

- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
- 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.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



Each drum shall have a minimum of 2 orange and 2 white stripes using Type A retro-reflective sheeting with the top stripe being orange.



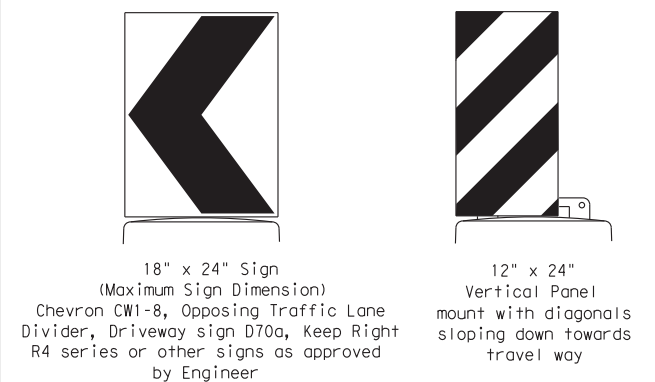
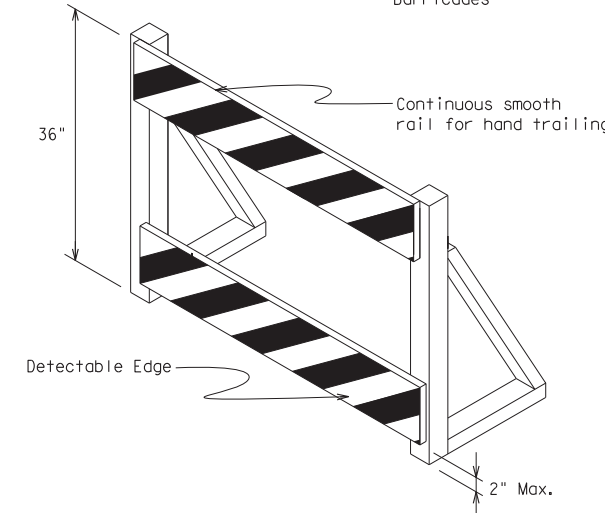
**DIRECTION INDICATOR BARRICADE**

- The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
- If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
- 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<sub>FL</sub> or Type C<sub>FL</sub> Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
- Double arrows on the Direction Indicator Barricade will not be allowed.
- 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.
- 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.
- 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.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 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.

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



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

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

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- 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.
- Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

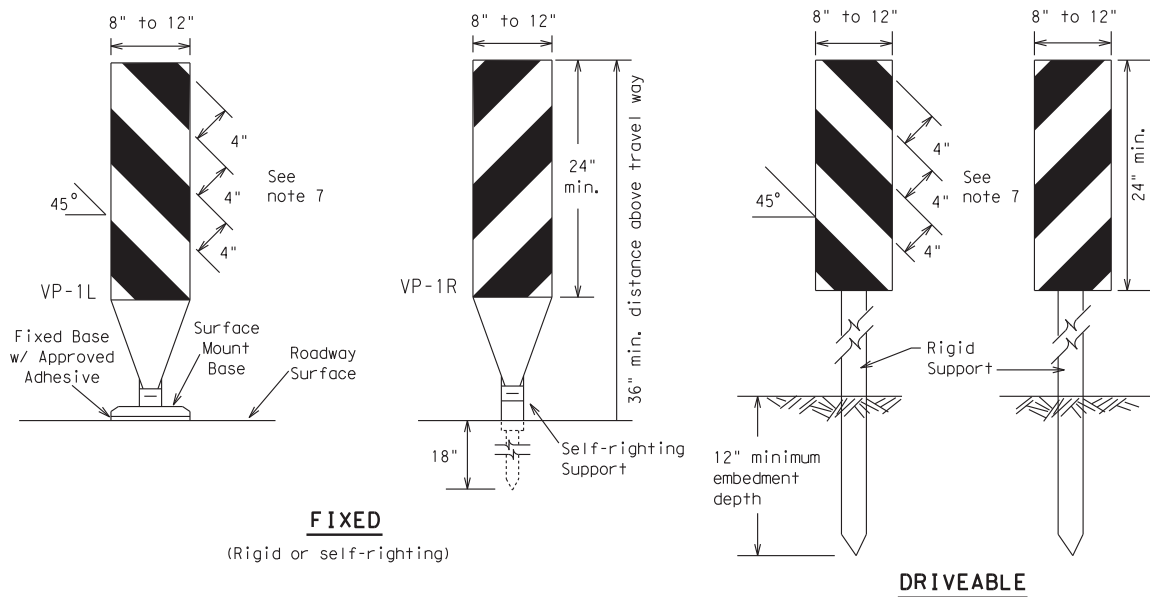
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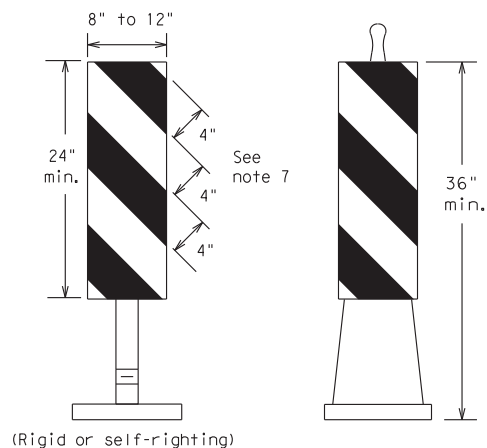


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**FIXED**  
(Rigid or self-righting)

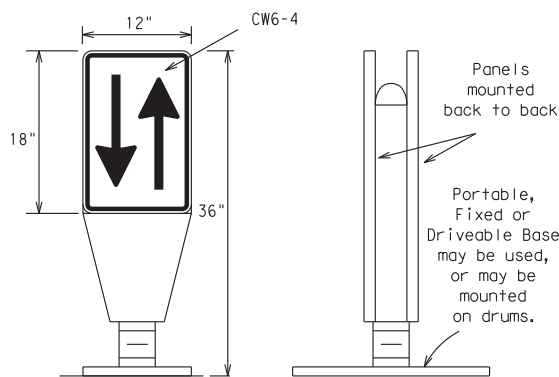
**DRIVEABLE**



**PORTABLE**

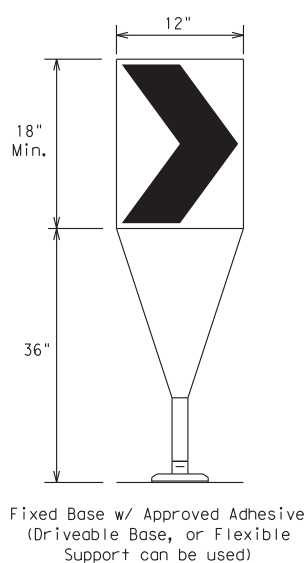
**VERTICAL PANELS (VPs)**

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



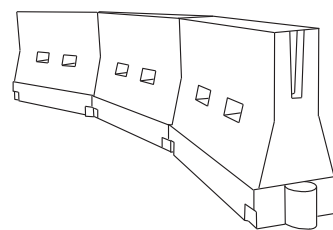
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

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



- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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**

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
- Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- 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.
- 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.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

**GENERAL NOTES**

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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 X	Formula	Minimum Desirable Taper Lengths X X			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

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

**SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS**

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (9) - 14**

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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS									
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13									

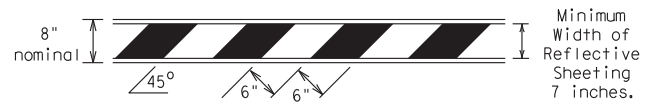
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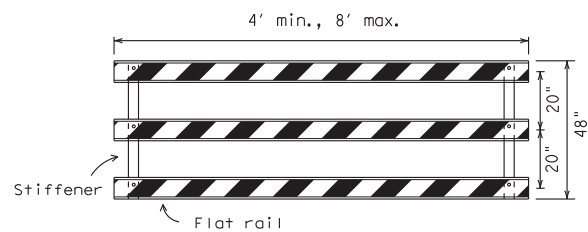
**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.

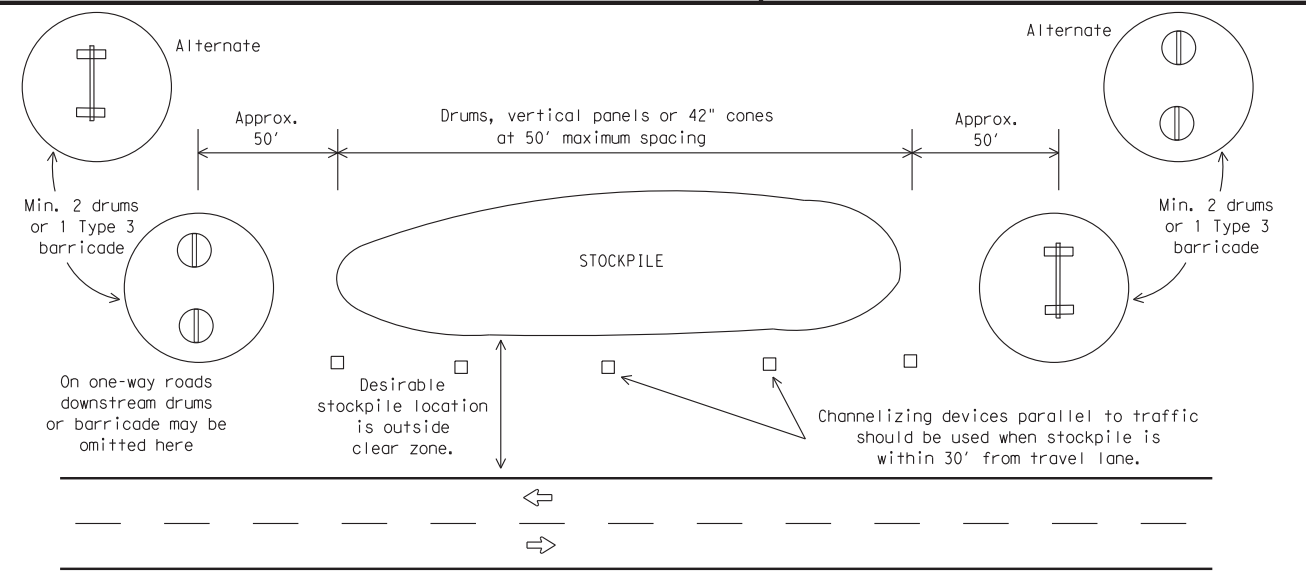


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



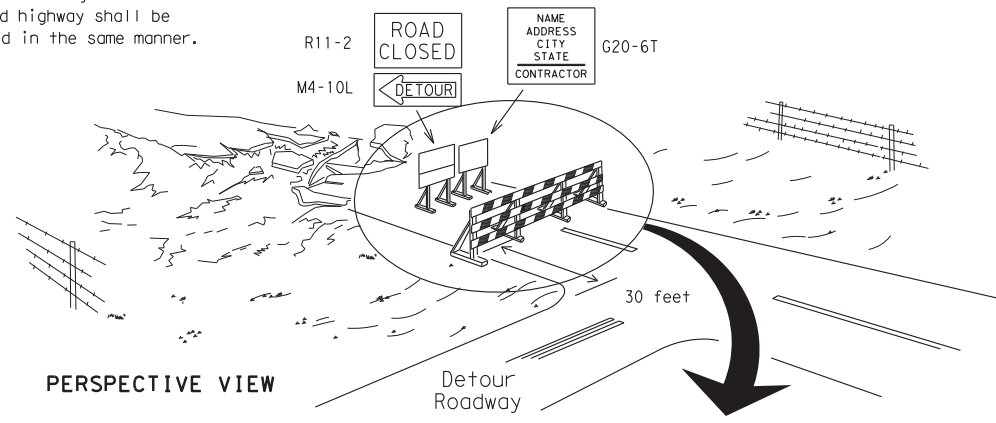
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**

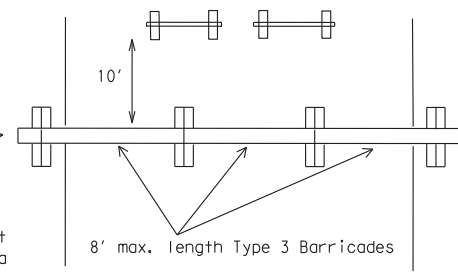
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

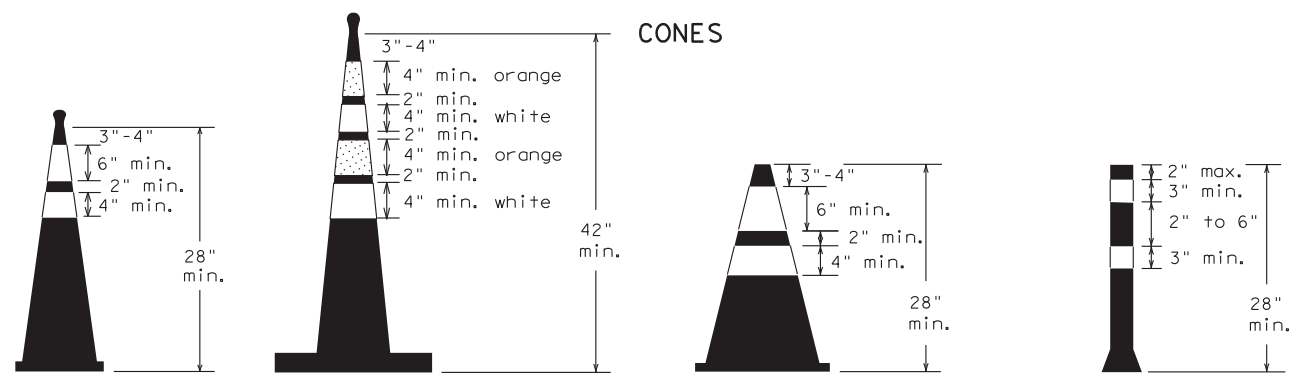
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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



PLAN VIEW

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



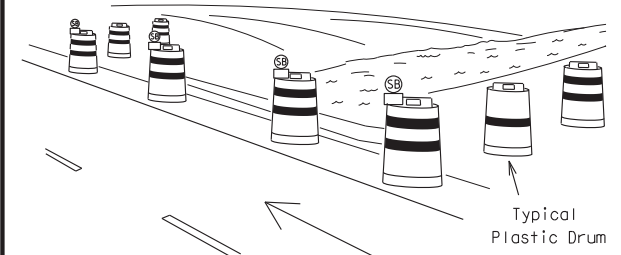
Two-Piece cones

One-Piece cones

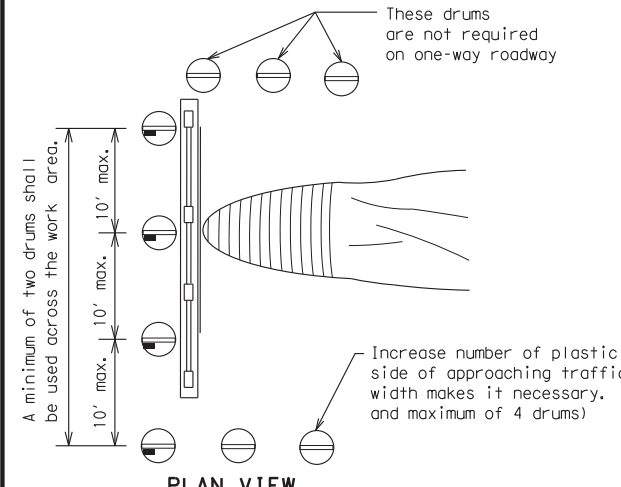
Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.  
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



PERSPECTIVE VIEW



PLAN VIEW

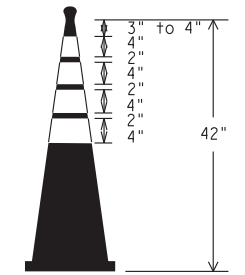
**CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS**

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

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

These drums are not required on one-way roadway. Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2 and maximum of 4 drums)

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



EDGE LINE CHANNELIZER

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

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**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

BC (10) - 14

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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).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

### RAISED PAVEMENT MARKERS

- 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

- 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.

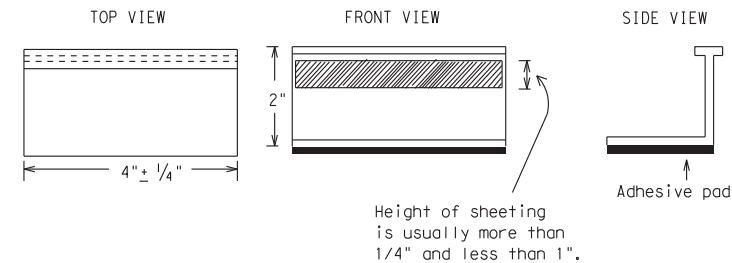
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- 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.
- Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

## Temporary Flexible-Reflective Roadway Marker Tabs



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

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
  - 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.
  - 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.
- Small design variances may be noted between tab manufacturers.
- 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

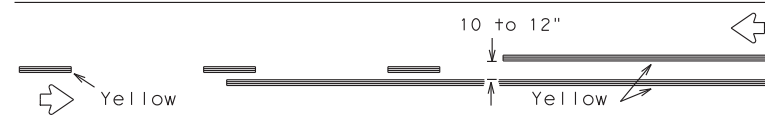
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11-02 8-14				
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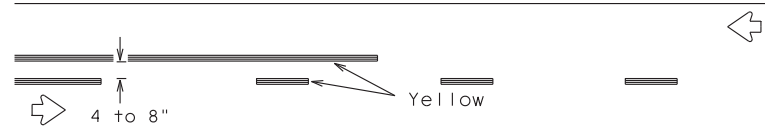
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## PAVEMENT MARKING PATTERNS

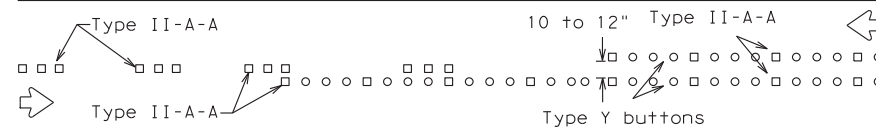


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

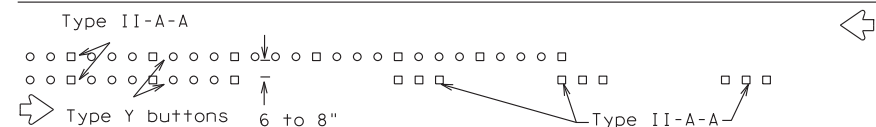


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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

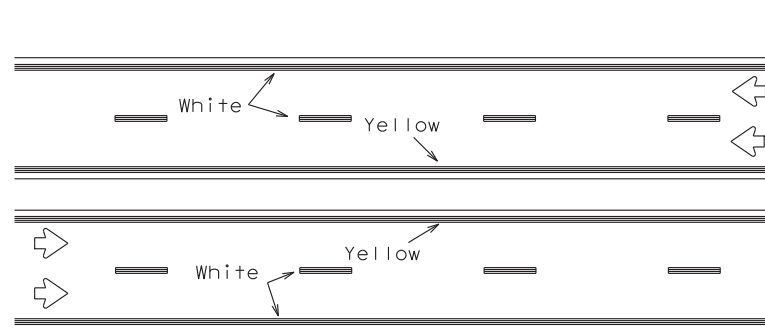


RAISED PAVEMENT MARKERS - PATTERN A



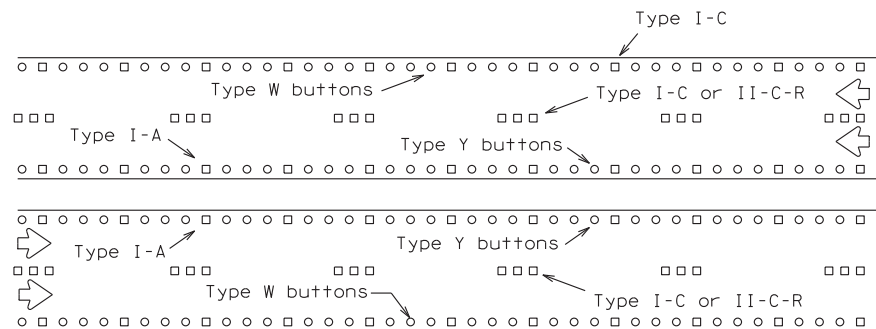
RAISED PAVEMENT MARKERS - PATTERN B

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



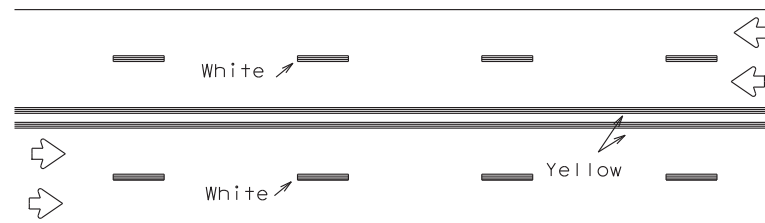
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



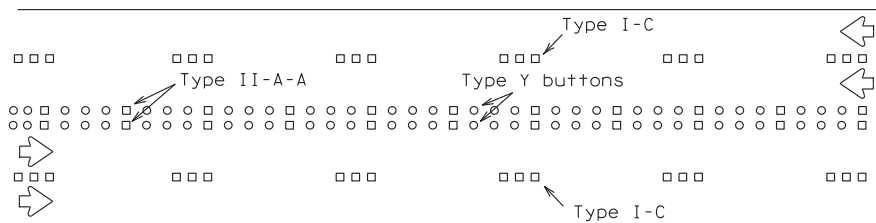
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



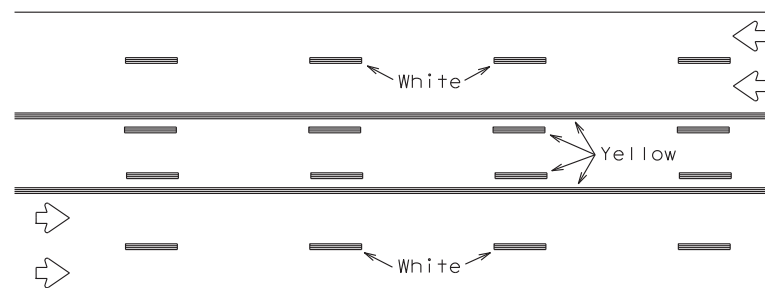
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



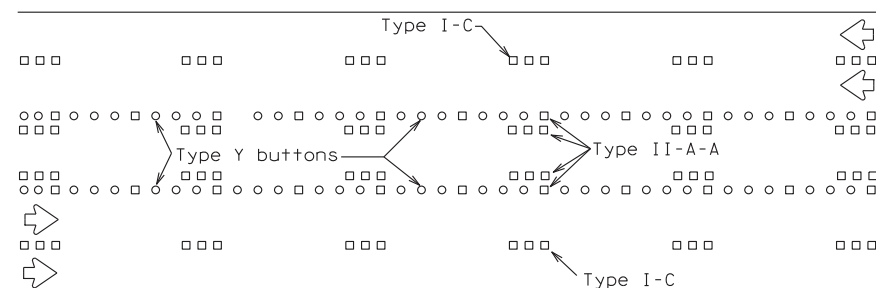
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

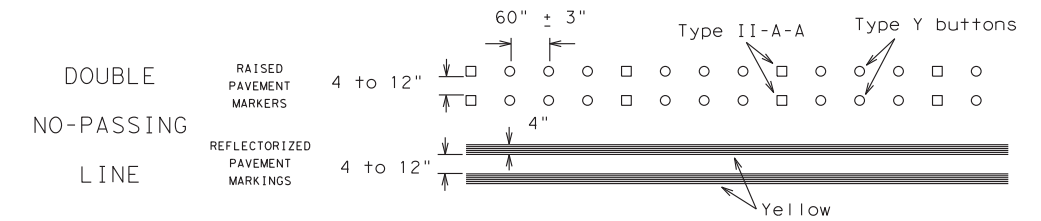
Prefabricated markings may be substituted for reflectORIZED pavement markings.



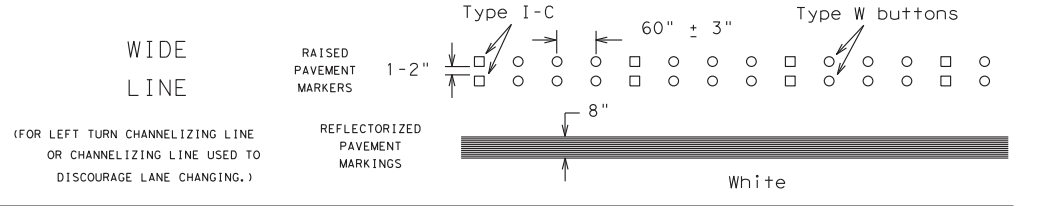
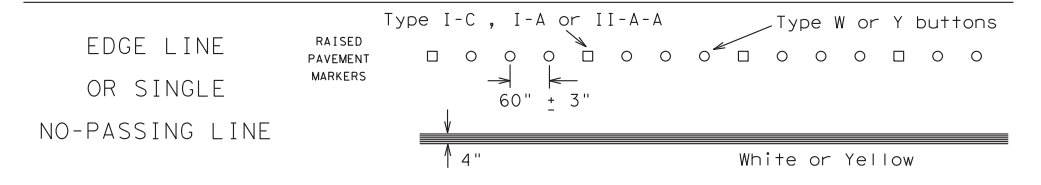
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

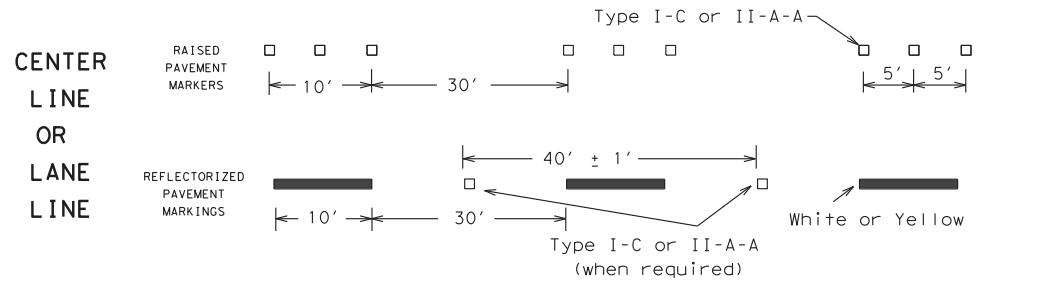
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



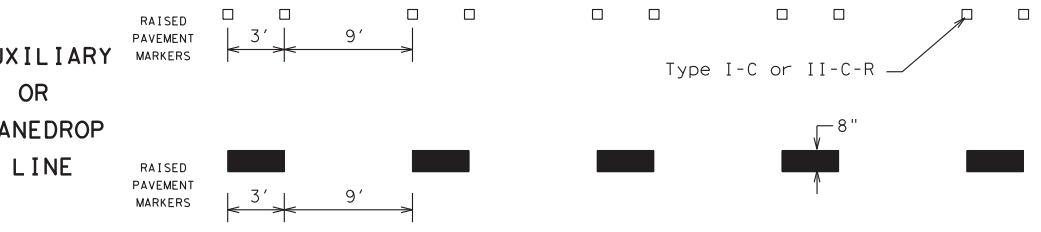
### SOLID LINES



### BROKEN LINES

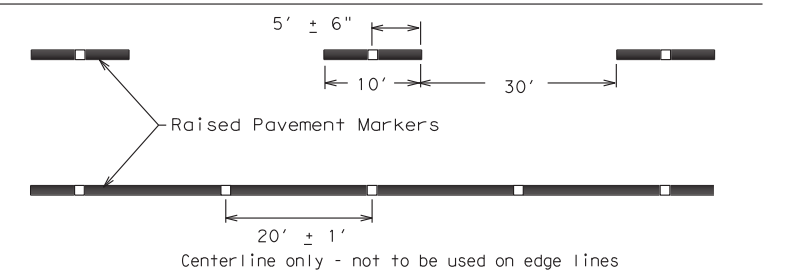


### AUXILIARY OR LANEDROP LINE



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC (12) - 14

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11-02 8-14				
DIST	COUNTY	SHEET NO.		

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

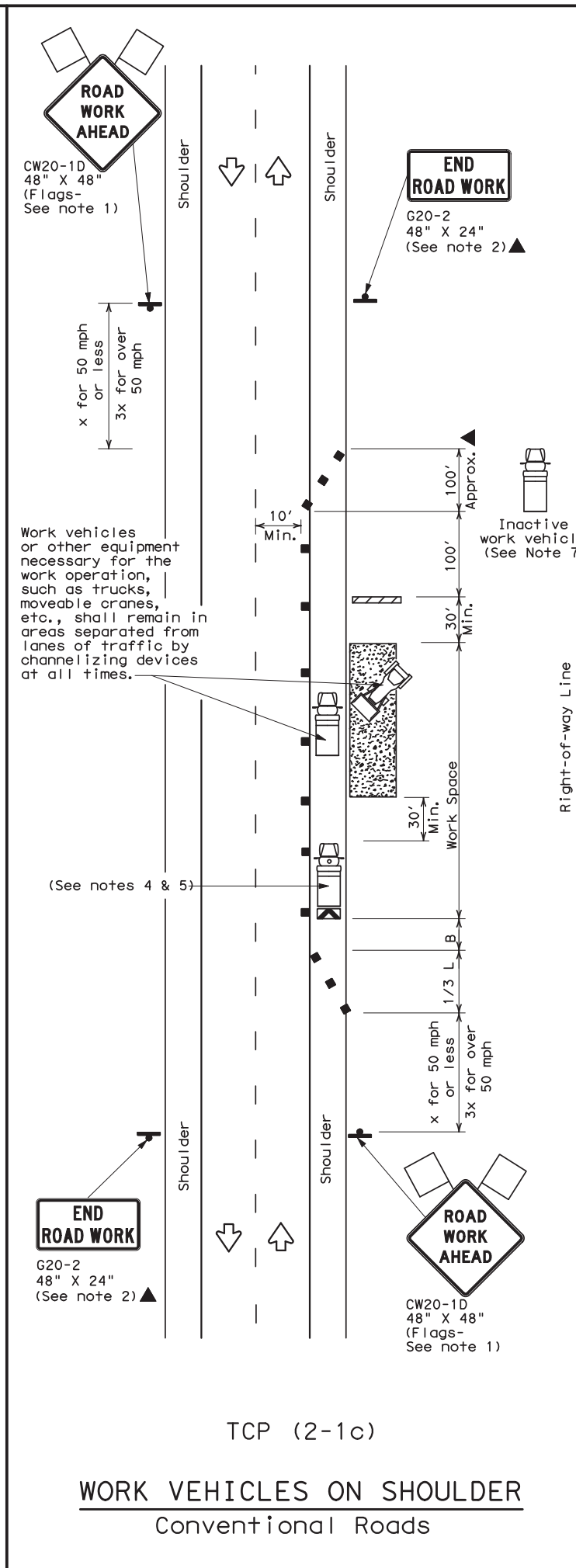
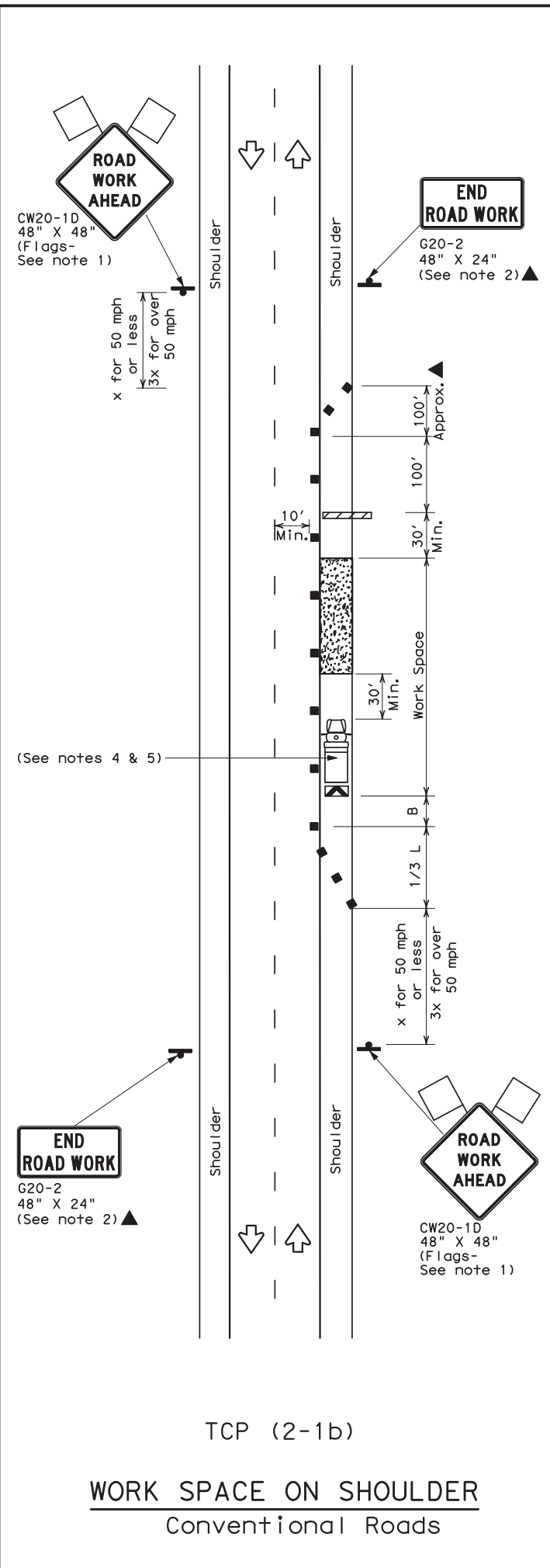
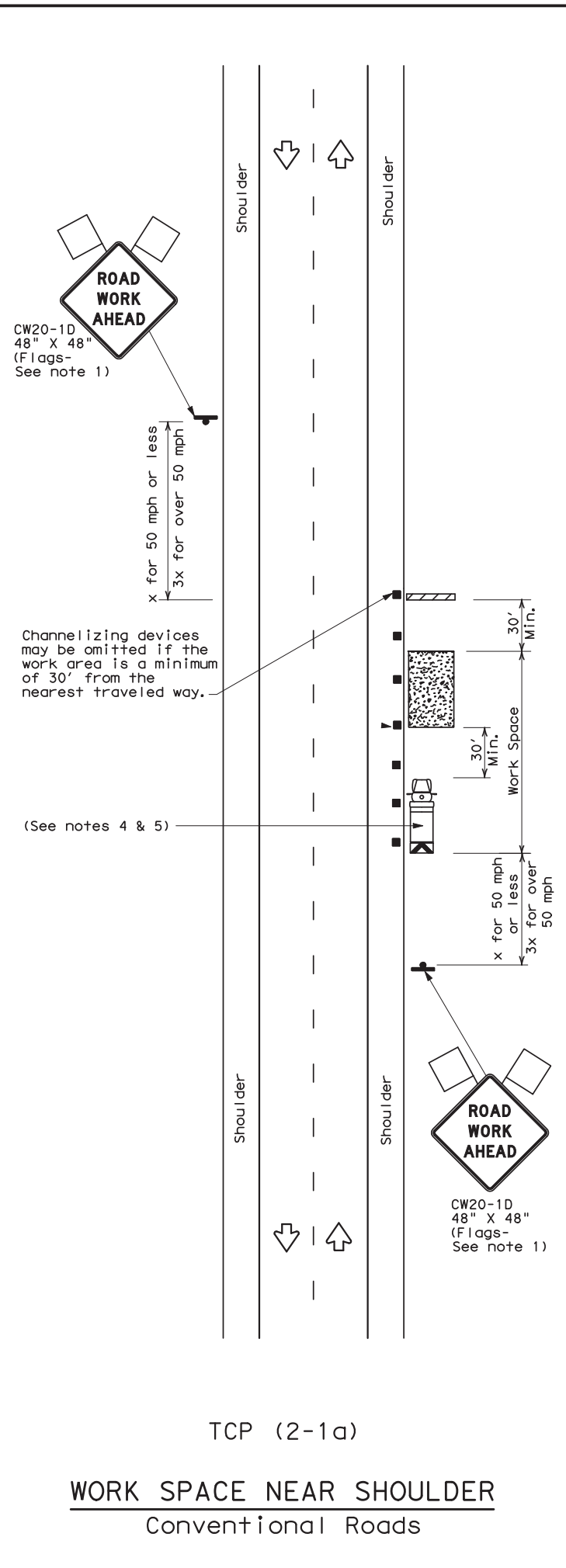
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LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

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

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

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

- 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 in the plans, or for routine maintenance work, when approved by the Engineer.
  - Stockpiled material should be placed a minimum of 30 feet from nearest traveled 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 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 off the paved surface, next to those shown in order to protect a wider work space.
  - See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
  - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
  - CW21-5 "SHOULDER WORK" signs may be used in place of CW21-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

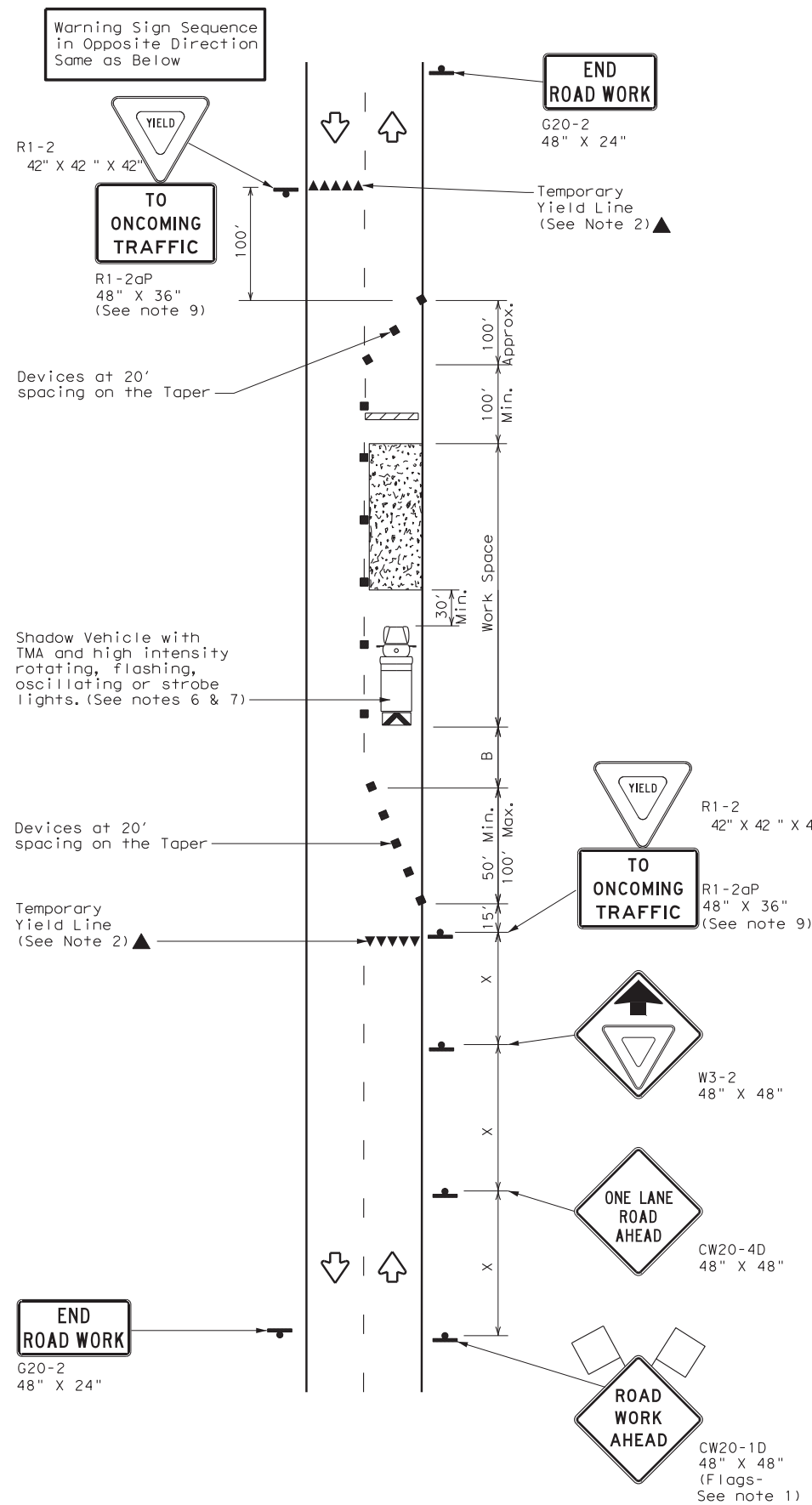


TRAFFIC CONTROL PLAN  
 CONVENTIONAL ROAD  
 SHOULDER WORK

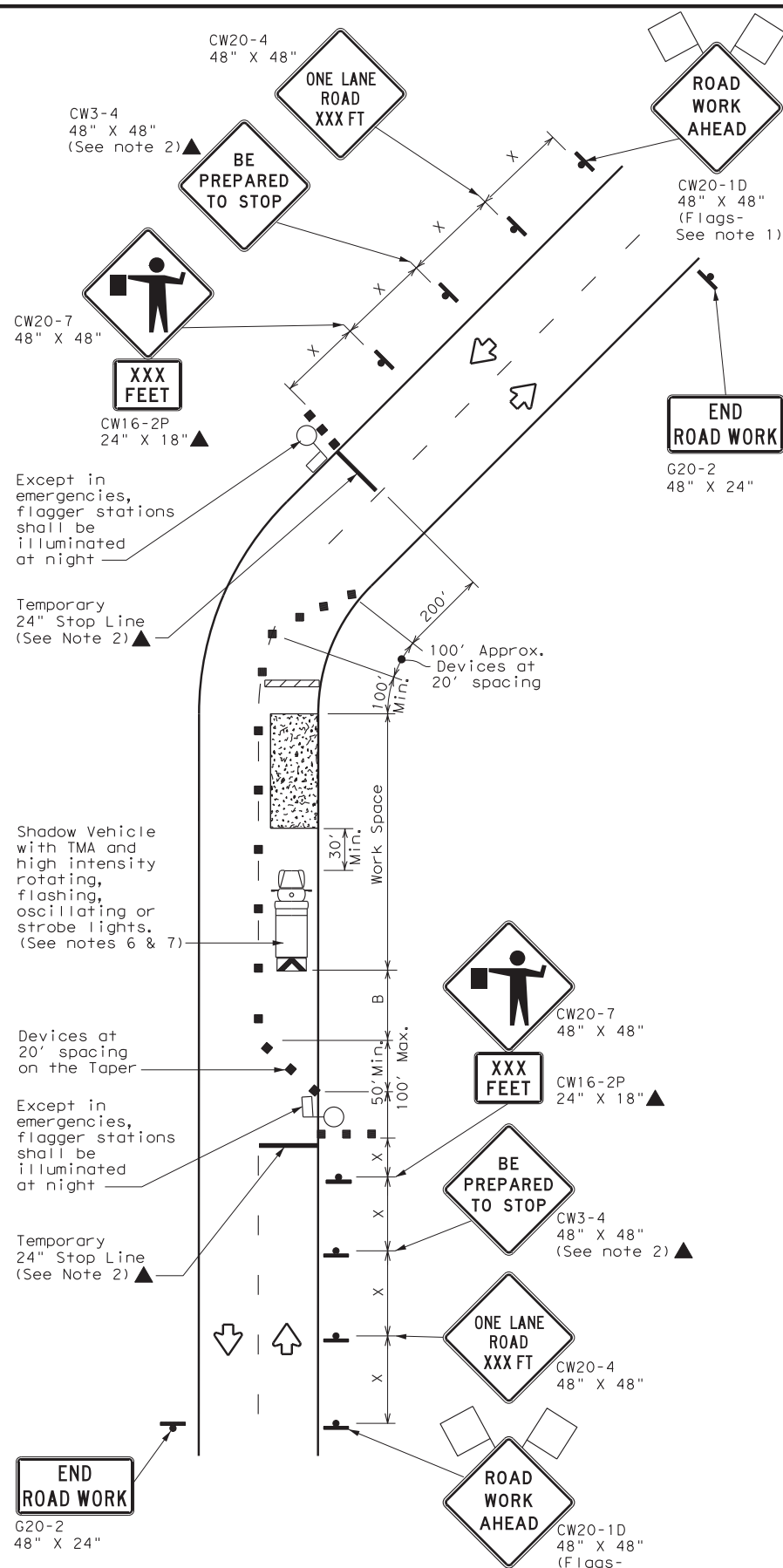
TCP (2-1) - 12

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TCP (2-2a)  
2-LANE ROADWAY WITHOUT PAVED SHOULDERS  
ONE LANE TWO-WAY  
CONTROL WITH YIELD SIGNS  
(Less than 2000 ADT - See Note 9)



TCP (2-2b)  
2-LANE ROADWAY WITHOUT PAVED SHOULDERS  
ONE LANE TWO-WAY  
CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	575'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

GENERAL NOTES

- 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.
  - The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
  - Flaggers should use two-way radios or other methods of communication to control traffic.
  - Length of work space should be based on the ability of flaggers to communicate.
  - 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 off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-2a)
- The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
  - The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.
- TCP (2-2b)
- Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
  - If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
  - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation  
Traffic Operations Division

TRAFFIC CONTROL PLAN  
ONE-LANE TWO-WAY  
TRAFFIC CONTROL

TCP (2-2) -12

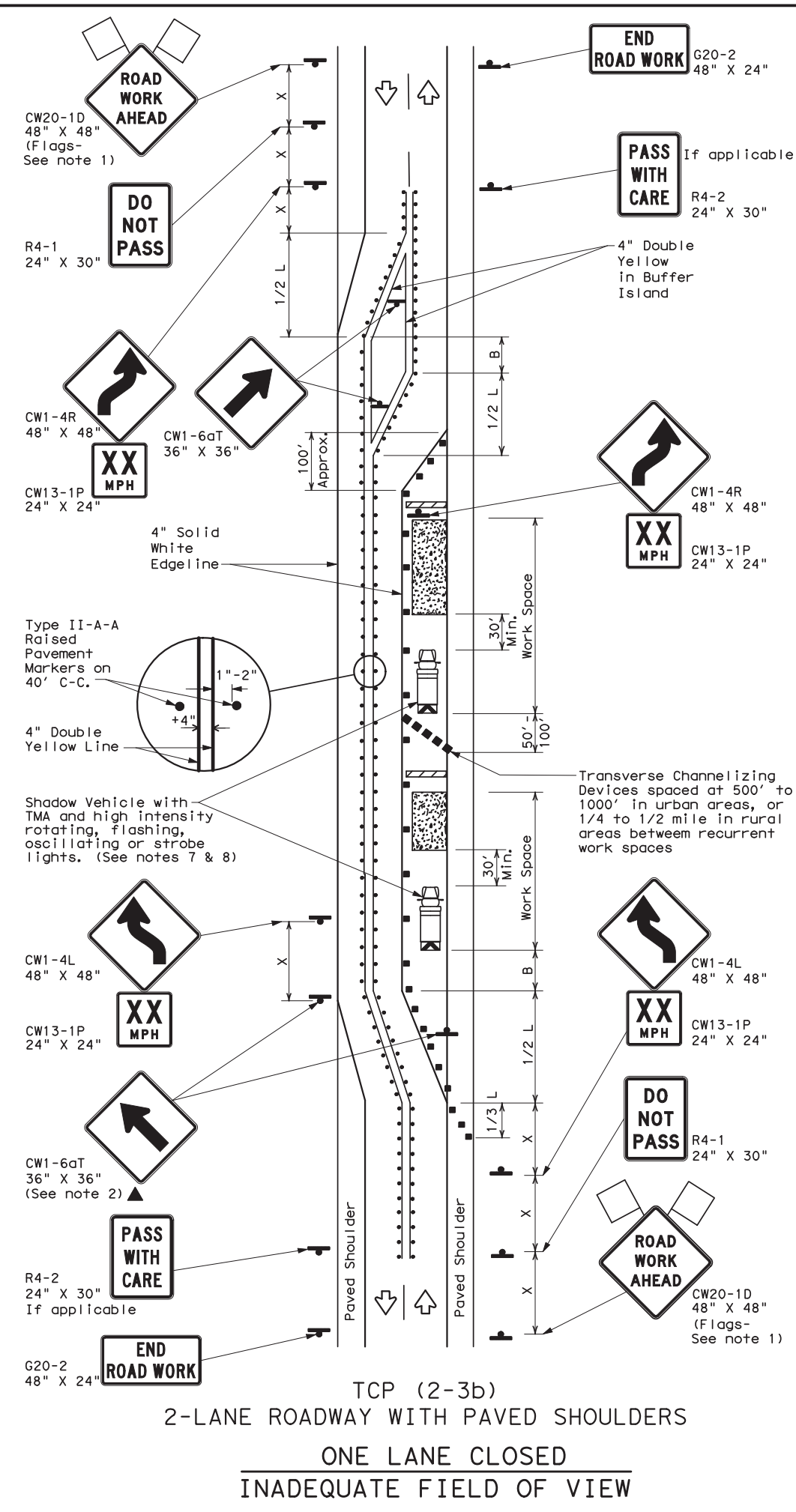
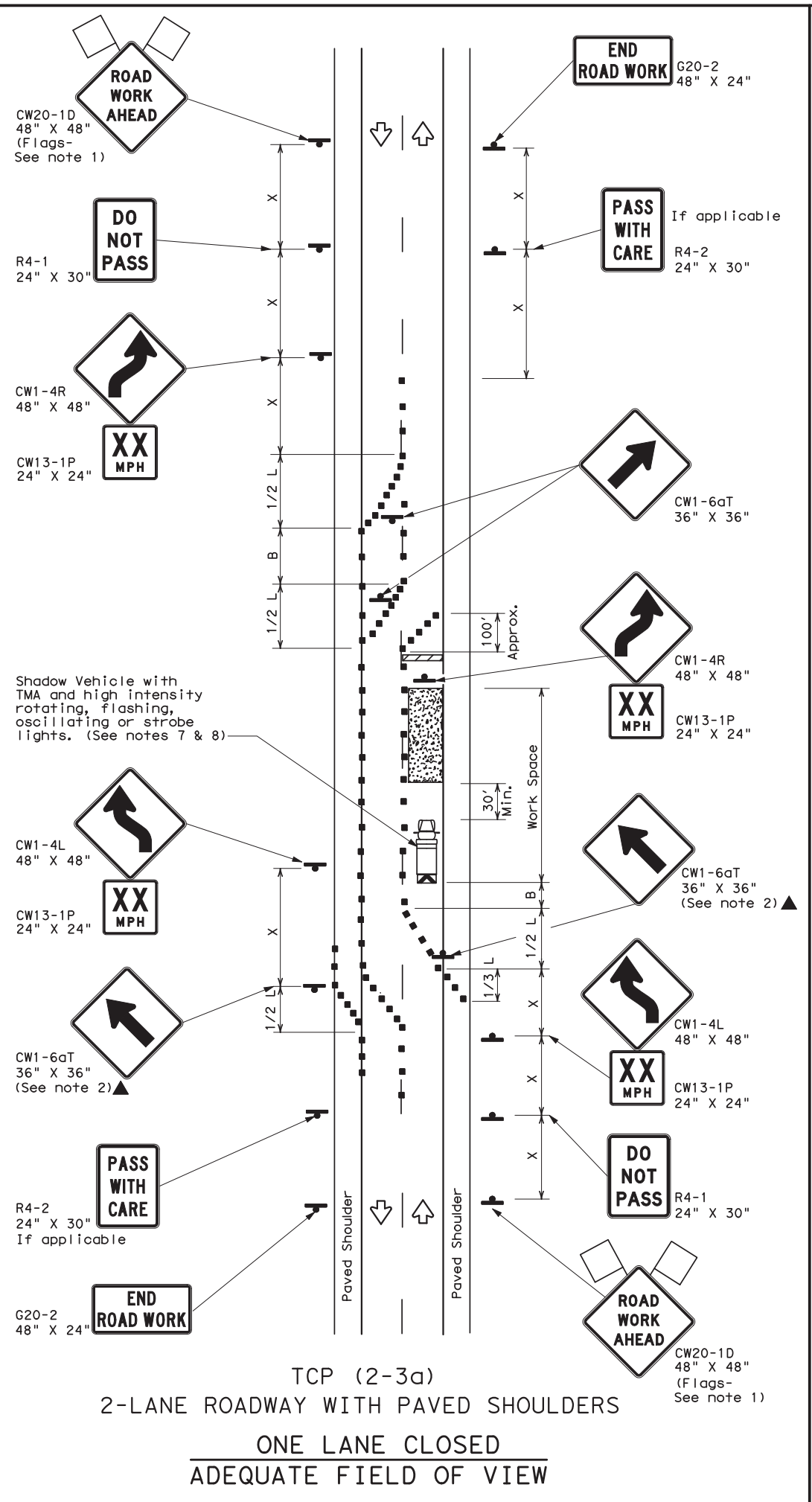
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**LEGEND**

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

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

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

**TYPICAL USAGE**

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓
				TCP (2-3b) ONLY

- 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.
  - 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 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.
- TCP (2-3a)**
- Conflicting pavement markings shall be removed for long-term projects. 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 of Transportation**  
Traffic Operations Division

**TRAFFIC CONTROL PLAN**  
**TRAFFIC SHIFTS ON**  
**TWO-LANE ROADS**

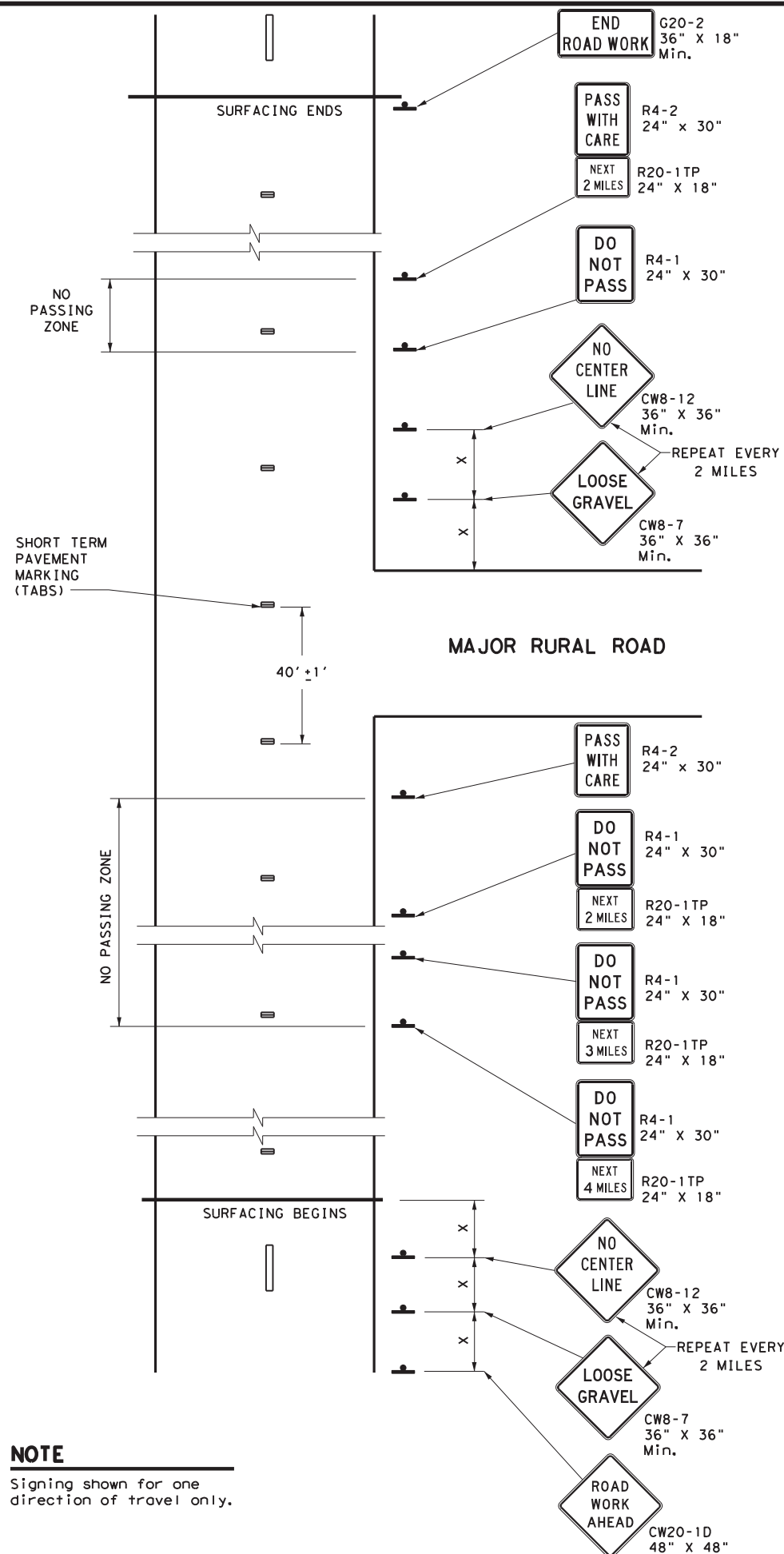
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For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

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163					

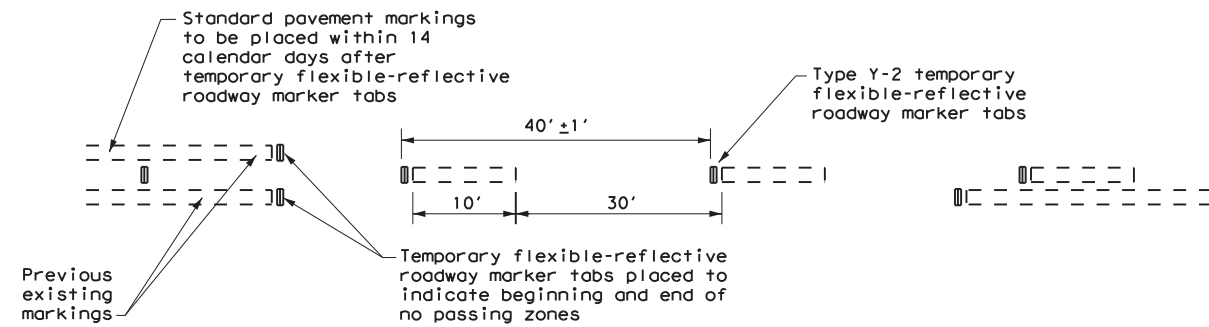
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**NOTE**  
Signing shown for one direction of travel only.

**NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS**



**TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS**  
For seal coat, micro-surface or similar operations

**"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES**

- A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.
- B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.
- C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.
- D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

**"NO CENTER LINE" SIGN (CW8-12)**

- A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.
- B. At the time construction activity obliterates the existing center line markings (low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.
- C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

**"LOOSE GRAVEL" SIGN (CW8-7)**

- A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.
- B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

**PAVEMENT MARKINGS**

- A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.
- B. Tabs shall not be used to simulate edge lines.
- C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

**COORDINATION OF SIGN LOCATIONS**

- A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.
- B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

\* Conventional Roads Only

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

**GENERAL NOTES**

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.



**TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS**

**TCP (7-1) - 13**

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